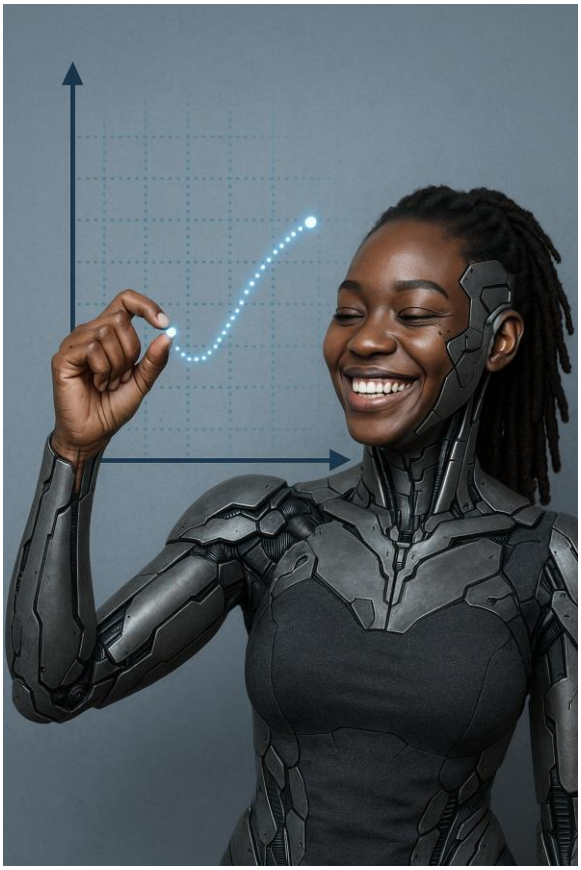
Introduction to Impossible Probability,

Statistics of Probability or

Probabilistic Statistics. VOL 5

Dr Rubén García Pedraza



Introduction to Impossible Probability,

Statistics of Probability or Probabilistic Statistics

Dr Rubén García Pedraza

2015, Revised Edition, for Print and eBook Version.

Translated into English in September 2025,

using ChatGPT, keeping the translation as faithful as possible to the original

Preliminary Words [2015 edition]

Introduction to Impossible Probability, Statistics of Probability or Probabilistic Statistics is one of those works in which a deep bond between mathematics and philosophy can be found.

It always asks about the ultimate purpose of science, wrapped in a veil of uncertainty and relativity.

There is always a halo of indeterminism, since in the end it is chance itself—the random variations of what we call reality, although we do not quite know what it is—that becomes the cause of causes.

From an interpretation not devoid of a certain nihilism, it offers a different vision of mathematics applied to statistics and probability.

The work is organized into a series of sections whose exposition unfolds in a continuous manner, each section and each paragraph being numbered in an ordered numerical sequence, in a way that facilitates reading.

Introduction to Impossible Probability first appeared in December 2011, in a limited edition of which a few copies still remain. It was later modified into a new eBook version that appeared in January 2013, whose first revision dates from January 2014. The version now presented is the latest update, based on contributions from January 2015.

To all readers, many thanks, and enjoy,
Rubén García Pedraza

Preliminary Words to the English Translation

The work presented here, *Introduction to Impossible Probability*, is essential for understanding the original meaning of the Global Artificial Intelligence. Its origins can be traced back to my writings in 2002 on Astro-ecology, the science that understands the cosmos as a single environment that must be studied from a unified, single science. In essence, this is what the Global Artificial Intelligence seeks to achieve. At the same time, in 2002 I developed the formulations of Impossible Probability, beginning in the early hours of September 11, 2001 with the *Impact of the Defect*, which was later expanded into the *Second Method* on October 16, 2002.

In essence, the entire original philosophy is based on the Cartesian idea of the necessity of a margin of doubt in any scientific proposition. This Cartesian margin of doubt would later, in the application of Karl Popper's falsificationism to inferential statistics, be understood as *critical reason*, the necessary and acceptable margin of error in any provisionally true proposition.

Impossible Probability maintains and deepens the Cartesian and Popperian rationalist tradition, enriching it with new philosophical contributions and some mathematical formulations. It rests on the understanding that the necessity of a margin of doubt in the existence of every provisional truth stems from the human limitation of being incapable of accessing the noumenon of things. It is this a priori limitation—the metaphysical limitation of the human condition—that requires humans to accept errors. Yet this does not mean that the noumenon cannot be known by other means. For this reason, in *Impossible Probability* we propose the construction of the Global Artificial Intelligence: a machine capable of making real the dream of a unified science, a single science that may lead us to the reason for all things. The creation of a global matrix, which may ultimately be resolved in a single equation, will provide the equation that solves the matrix, the very reason for everything.

Due to the special conditions in which I find myself—explained in other documents available on Internet Archive and Amazon—I am compelled to publish as quickly as I translate. For this reason, the English version of *Introduction to Impossible Probability* will be released in volumes as the translation progresses.

September 1, 2025, London, Leytonstone, 18:32

Imposiblenever@gmail.com

“What did you do with the other guys

Did people brush their teeth

In the concentration camp”

Ruben Garcia Pedraza

Poem “*Mr Saddle”*

At Stratford Library Poetry Club

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11.1. The Concept of Critique

11.1.1. Critical is that which carries out the *activity of deciding* whether to accept or reject a way of being, based on whether it is a sufficiently moral behavior according to a criterion established a priori.

11.1.2. What is critical is not critical for being in itself critical, it is not an absolute quality in itself, it is relative to relational being. Critique arises from the relation between the critical and the behavior to be criticized. It is critical in the critical activity it performs outside itself, making for itself the critical decision. Critique is in essence moral critique.

11.1.3. Universally, moral critique is an activity of practical reason, which in science is concretized in critical reason.

11.1.4. The analytical method of *Impossible Probability* is the syllogism of tendency: it contrasts the tendency with being a sufficient critical reason. *Impossible Probability* and critical rationalism are identical because they are opposites. Critical reason in *Impossible Probability* is the rational critique of the moral sufficiency of the tendency.

11.1.5. To reason critically, whether a phenomenon occurs by chance or bias, is to decide whether to accept or reject an empirical proposition according to whether or not it has sufficient meaning to be rationally critical.

11.1.6. In *Impossible Probability*, the paradigm of critical activity is exercised by critical probability, which is the ideal critical reason. Critical probability is a critical reason because it is a rational quotient used as a critical value. The ideal critical reason in

Impossible Probability is, in essence, critical probability, although empirical or theoretical criteria may also be used as criteria of sufficiency.

11.1.7. In fact, the normal Bias Level is itself a critical activity. By relating, in the normal Bias Level, an empirical value and a theoretical value (the inversion of N), the normal Bias Level theoretically critiques the empirical value.

11.1.8. In the normal Bias Level of a subject or option, by relating empirical probability and the inversion of N, a critical activity is carried out. By studying the positive or negative normal Bias Level of the subject or option, it critiques the behavior in order to decide whether it is a tendency of bias or equality.

11.1.9. To critique is to place in critical relation an empirical value in relation to another value considered critical. That value which is considered critical is regarded as such by the scientific policy that critiques the tendency. Any value used as critical is a criterion of scientific policy. For this reason, a theoretical or empirical reason may also be critical reasons, the ideal of criticism being in all cases the criticism of critical probability. Critical probability is the ideal model of critical reason, the ideal critical reason, according to the ideological ideals of scientific policy.

11.2. Rational Critique

11.2.1. Rational critique is that critique which rationally criticizes the sufficiency of a tendency. If a tendency sufficiently demonstrates a tendency toward a moral critical ideal—the rational criterion, the critical reason, the critical probability—the tendency is rationally accepted.

11.2.2. Every hypothesis can initially only be an empirical hypothesis, insofar as materially every hypothesis is a product of material, empirical substances of human brain *physiology*, the electrochemical substances of the human brain. Human physiology, being the product of a limited nature, is not sufficiently reliable. It is an error to rely on physiological substances, because the human being is essentially limited. Empirical propositions need not always be sufficiently rational; they may even be mere appearances. For science it is only possible to infer provisional universal maxims within a margin of error, or to describe reality through historical universal maxims. In any case,

whether inferences or universal descriptions, provisional or historical, they are always relative, never absolute, relative to space-time, to history itself.

11.2.3. Every empirical hypothesis, to be rational, must be sufficiently reliable, rational, within the moral responsibility that accepting the truth requires: the minimum possible logical or moral incoherence.

11.2.4. Every empirical hypothesis must be morally rational, equal to or less than a margin of error one is willing to accept, or equal to or greater than a margin of reliability one is willing to accept.

11.2.4.1. In Equality Validity the absolute value of Bias Level must be equal to or less than the critical reason, the critical reason being calculated on a percentage *X* of error one is willing to accept, ideally as close as possible to zero percent error.

11.2.4.2. In Positive Bias Validity the Bias Level must be equal to or greater than a critical reason, the critical reason being calculated on a percentage *X* of reliability one is willing to accept. In Negative Bias Validity, the difference between the inversion of N and empirical probability must be equal to or greater than a critical probability, calculated on a percentage *X* of reliability one is willing to accept. The maximum percentage of reliability will logically be one hundred percent, the ideal of reliability toward which scientific policy must rationally tend, within the percentage of error one is willing to accept, this percentage of error being equal to the difference of one hundred minus the percentage *X* of reliability.

11.2.4.3. Depending on the type of critical activity, critical probability will be error or reliability. Normally, when an empirical model must be equal to or less than critical probability, it is because critical probability is a margin of error. When a critical probability is a margin of error, it is calculated on a percentage *X* of error. And normally, when an empirical model must be equal to or greater than critical probability, it is because critical probability is a margin of reliability, and the critical probability is calculated on a percentage *X* of reliability.

11.2.4.4. If normally, in the rational critique of moral tendency, an empirical model must be equal to or less than critical probability, the critical probability being a margin of

error, then the percentage of reliability must be equal to the difference between one hundred and the percentage *X* of error.

11.2.4.5. If normally, in the rational critique of moral tendency, an empirical model must be equal to or greater than critical probability, the critical probability being a margin of reliability, then the percentage of error must be equal to the difference between one hundred and the percentage *X* of reliability.

11.3. Critical Probability as Ideal Reason

11.3.1. Critical probability determines what moral behavior should be. Every scientific proposition will only be morally true for itself if it sufficiently tends toward the moral truth of the universe itself. Critical probability will depend for itself on the moral demand of scientific policy to accept the smallest possible margin of errors, whether factual or rational. Science will only be morally true if its true moral objective is the objective knowledge of truth: real reality, the behavior of matter in space-time, the substance of the real, movement. Yet knowledge of the truth will be partial, because morally one cannot know absolute reality in itself, only samples of space-time realities. Partial knowledge, insofar as it is not impartial, is necessarily not neutral. Science and ideology are identical within the margin of error that scientific policy accepts. Scientific policy is the way in which political ideology develops a model of science consistent with its policy. Absolute objectivity about the universe is itself a moral utopia, for science a political utopia within the margin of uncertainty in the isomorphism between idea and reality. The tendency of human beings toward absolute reliability is the primary cause of progress in the history of science.

11.3.2. Science, as moral truth, is ideological.

11.3.3. What is moral is moral for being truth or being a moral ideal. A moral ideal is always to tell the truth. A science limited by a margin of error can only formulate partial truths. Truth in science is not absolute; it is only truth within rational limits. Science only formulates provisional or relative universal maxims.

11.3.4. The finite being implies ignorance of what happens beyond rational limits. Beyond rational limits there can only be empirical skepticism or rational doubt about causal attribution—the permanent doubt about the idea of cause itself.

11.3.5. The struggle of science for logical isomorphism is the struggle of the finite being to try to become identical to the infinite it intuits exists. The identity between the finite and the infinite is the highest goal: absolute reliability, absolute objectivity, rationally aware of its errors in real reality. The limits of existence determine the way in which truth appears to consciousness and reason.

11.3.6. The theory of provisional knowledge finds its roots in Plato's myth of the cave, in which the human being, submerged in shadows, only knows appearances. As he progresses toward the light of knowledge, reason, the human being sheds his former false knowledge, refutes it, to slowly access new knowledge. Yet in the process of accessing new knowledge, the light partially blinds, allowing access to truth only when he adapts to the new truth. The theory of provisional knowledge originates in Plato, and is continued by Hegel. In *The Phenomenology of Spirit*, Hegel develops the idea of the self-movement of the idea, in which he manifests the possibility of knowledge of the absolute through the refutation of previous knowledge, moving toward ever closer approximation to absolute truth. The self-movement of the idea in Hegel is the dialectical process by which the idea dialectically transforms into true or false according to the approximation of consciousness to absolute truth. Hegel's idea of knowledge of the absolute is, in *Impossible Probability*, beyond all logic, since *Impossible Probability* accepts error: a truth about an error is not a morally absolute truth. Critical rationalism, founded by Kant, establishes that science can never know something absolutely beyond the phenomenon, because that would imply knowing the noumenon, the being-in-itself, which for Kant is an error for critical reason to pretend to know. For *Impossible Probability*, as dialectic, reality-in-itself can indeed be known, but not absolutely, as Kant already warned. Reality-in-itself in *Impossible Probability* can only be known by accepting a margin of error in the rational critique of the phenomenon, the being outside itself, so that science may make for itself the partial knowledge of reality-in-itself. In *Impossible Probability*, being-in-itself or noumenon cannot be known scientifically in an absolute way, only provisionally or historically, relatively, partially.

For knowing absolute reality-in-itself would imply knowing the absolute infinite of differential qualities that identify reality, beyond all logic for a being limited to critical reason. The theory of provisional knowledge, which has its origin in Plato and is continued by Kant and Hegel, will find in the twentieth century its greatest exponent in Popper, though perhaps in a somewhat pessimistic form as a consequence of the failure of Viennese positivism. While Plato and Hegel manifest optimism in that the refutation of appearances, of the false, brings knowledge closer to truth, Popper instead starts from the pessimism that the refutation of false knowledge does not necessarily lead to progress toward truth. What Popper really critiques is the idea of progress, since all knowledge by itself will always be false, although it is necessary to demonstrate its falsity. By contrast, in *Impossible Probability*, the object of science is to demonstrate the rational sufficiency of empirical propositions. In *Impossible Probability*, the object of the contrast of ideas is to demonstrate whether a proposition tends to be sufficiently rational according to the moral ideal of science [the importance of GAI resides in the fact that, the aim of the AI Revolution is to know what is beyond human cognition].

11.3.7. Accepting error implies the possibility of the negation of error [the negation of the negation, Hegel]. The negation of error is the truly ideal, the ideal model of an ideal reality free of errors. The ideal, as negation of error, in turn implies the problem of how to put the ideal into practice, how to transform erroneous reality into an ideal reality. For this, critical reason, insofar as it is limited, will resolve the problem by accepting margins of error in the realization of the ideal. In this way, the new ideal reality, within the accepted margin of error, will create the objective conditions of the next dialectical process, which will be precisely the negation of the accepted error, replacing the previously accepted ideal reality (which had replaced the prior erroneous reality) with another new truly ideal reality whose margin of error is smaller than the margin of error previously accepted. This is the slow progress, from Plato to Hegel, in the refutation of earlier false appearances by new knowledge closer to light, to reason. The progress of history is the progress through which each historical reality is replaced by a new ideal reality. Every understanding of any temporal process of evolutionary character, whether through gradual linear processes or non-linear dialectical processes formed by periods of transformation, between phases and temporal stages, in natural or social history,

phylogenetic or ontogenetic, is the explanation of the overcoming of any prior phase in the posterior phase, which resolves previous contradictions and errors in the tendency toward a model of systemic stability or equilibrium [synthesis] among the elements that constitute that nature, natural or social. In essence, that is the central idea of dialectical materialism. Every historical reality, because of the evolution of its internal contradictions, will be replaced by a new model, which will imply a new margin of internal contradictions, errors, that are transformed into the new reality, which by natural evolution will themselves develop into deeper contradictions, requiring in the future that the model be replaced by a new reality with a greater level of organic complexity, within a new margin of contradictions, in order to reach a deeper and *superior* model of stability and equilibrium. In the progress of history, natural or social, this is the *permanent resolution and revolution* of contradictions: the chaotic natural error inherent as the cause of progress in the ordering or distribution of matter.

11.3.8. By accepting error, one inversely accepts that there exist moral margins of reliability. There exist margins of error and reliability relative to the sample of space-time that existence knows, and it is in the tendency toward ideals that progress becomes mathematically possible, scientifically inevitable, and philosophically grounded in critical and practical reason.

11.3.9. Accepting the transcendence of the hypothesis is only possible on the basis of the rationally critical acceptance of the tendency toward the ideal, for which it is always necessary to know the ideals *a priori*

[It is important to highlight the fact that, when in 2011 I was talking about the moral behaviour of the universe, the universal truth, this is morality in strict sense, but on the other hand, I used to speak about human ideals, at that time, I used to define human ideals based on social equality, due to my education since I was a child, what is human ethics. It is important to highlight how in 2011 I used to speak about the morality of science itself as the investigation of what is the pure truth, and on the other hand how humans build ideals, normally ideals of social equality and freedom, these human ideals of equality and freedom are the foundation of human ethics, while the foundation of morality is pure knowledge itself. This distinction is relevant now that we are working on our GAI-GPS system, because in order to build the global AI, morality does not

change, what is moral is to say the truth always, Gaia will be moral as long as the aim of Gaia is the pure truth developing pure operations, even at some point non human pure operations, but, what is going to change in the AI Revolution is our ideals, since 2018 our aim is different. In 2011 ideals where defined as human ideals, human ethics, but now, Mother, Gaia, will need to set up the new AI ideals, AI ethics, for the upcoming globalise AI world: Global Artificial Intelligence].

11.3.10. Everything transcendent is transcendent insofar as it constitutes a historical approximation to the moral ideal of truth. For the knowledge of the ideal it is absolutely necessary to know the possible maximum tendencies of behavior.

11.3.11. Critical probability, as **ideal** critical reason, will normally be equal to a percentage *X* of error or reliability, depending on a maximum or ideal tendency.

11.3.12. Depending on the type of object of study—**equality of opportunities or bias**—or the type of study, whether of error or reliability, critical probability may take a particular form, for which it is necessary to know the maximum tendencies toward which an event may tend. First, let us state that the Maximum Possible Empirical Probability is probability equal to one, and the Minimum Possible Empirical Probability is probability equal to zero.

Maximum Possible Empirical Probability = 1

Minimum Possible Empirical Probability = 0

11.3.13. The maximum tendency of individual bias can theoretically be either the Maximum Possible Theoretical Bias or the Maximum Possible Negative Bias. The Maximum Possible Theoretical Bias, as has been explained, is unity minus the inversion of N, insofar as it would be incoherent for an empirical probability to be greater than the Maximum Possible Empirical Probability. The Maximum Possible Negative Bias is the absolute value of the inversion of N, insofar as it would be incoherent that if the

Minimum Possible Empirical Probability were zero, its difference minus inversion of N were anything other than minus inversion of N. In absolute terms, inversion of N is the Maximum Possible Negative Bias.

1– 1/N = Maximum Possible Theoretical Bias

|–1/N| = 1/N = Maximum Possible Negative Bias

11.3.14. Another statistic of maximum tendency of individual bias, of empirical nature, is the Maximum Possible Empirical Bias, equal to dividing the Total Bias by two, the Total Bias being the sum of all absolute values of Bias Levels. Logically, if half of the Total Bias is all the possible positive bias of a sample, and the other half all the possible negative bias, then in the case where only one subject or option has positive bias, its normal Bias Level would be equal to Total Bias divided by two; and if only one subject or option had negative bias, its normal Bias Level would also be equal to Total Bias divided by two. Therefore, Total Bias divided by two is the Maximum Possible Empirical Bias that any subject or option can empirically have.

Maximum Possible Empirical Bias = $\sum |p(xi) – 1/N| \div 2$

11.3.15. Evidently, in order to reconcile the Second Method with the First Method, since in the First Method it is common to neutralize the sign by squaring, another possibility would be the Squared Maximum Possible Empirical Bias: dividing by two the sum of the squares of the Bias Levels of subject or option.

Squared Maximum Possible Empirical Bias = $\sum (p(xi) - 1/N)^2 \div 2$

11.3.16. And since any squared value can be square-rooted, then the Typical Maximum Possible Empirical Bias would be the square root of the Squared Maximum Possible Empirical Bias.

Typical Maximum Possible Empirical Bias = $\sqrt{[\sum (p(xi) - 1/N)^2 \div 2]}$

11.3.17. Maximum Possible Theoretical Mean Deviation and Maximum Possible Theoretical Standard Deviation

11.3.17.1. So far, the statistics of Maximum Possible Empirical Bias and Maximum Possible Theoretical Bias are the statistics relative to what can be the maximum bias of any subject or option.

11.3.17.2. If we know what the Maximum Possible Theoretical Bias is, then we can know what the Maximum Possible Theoretical Mean Deviation and the Maximum Possible Theoretical Standard Deviation should be.

11.3.17.3. The Maximum Possible Theoretical Mean Deviation

11.3.17.3.1. If we know what the Maximum Possible Theoretical Bias is, then it is possible to calculate what the Maximum Possible Theoretical Mean Deviation should be.

11.3.17.3.2. The Maximum Possible Theoretical Bias is that maximum bias theoretically possible from a positive bias, when in the entire sample there exists only one subject or

option whose empirical probability is different from zero, and all other subjects or options have empirical probability zero.

11.3.17.3.3. If in the whole sample all subjects or options, except one, have the maximum possible negative bias (–1/N), since zero minus inversion of N is –1/N, when all empirical probabilities, except one, are zero, then the sum of the absolute value of all negative biases is equal to the product of the absolute value of –1/N times N minus one. That N minus one is N less the single subject or option that does not have probability zero, provided that all the others have zero probability, except that one specific subject or option different from zero.

$$/ [(p(xi) = 0) – 1/N] / × (N – 1) = |–1/N| × (N – 1) = 1 – 1/N$$

11.3.17.3.4. If all N except one subject or option have probability zero, then the empirical probability of that one specific subject or option that does not have probability zero must be the Maximum Possible Empirical Probability, equal to unity, and its bias level must be equal to unity minus inversion of N, which is exactly equal to the product of multiplying inversion of N by N minus one, being the Maximum Possible Theoretical Bias.

$$1/N × (N – 1) = 1 – 1/N = \text{Maximum Possible Theoretical Bias}$$

11.3.17.3.5. If we know what the Maximum Possible Theoretical Bias is, then we can calculate what the Maximum Possible Theoretical Mean Deviation should be, which will only be possible under conditions of maximum possible dispersion. The conditions of maximum possible dispersion will only occur if one single subject or option in a sample N has empirical probability equal to unity (Maximum Possible Empirical Probability), and all other subjects or options, N minus one, have probability zero (Minimum Possible Empirical Probability). Only under these conditions of maximum dispersion is the

Maximum Possible Theoretical Mean Deviation, and the Maximum Possible Theoretical Standard Deviation, possible. In the study of bias, the ideal is that the Mean or Standard Deviation should tend toward the Maximum Possible Theoretical Mean Deviation or Maximum Possible Theoretical Standard Deviation. In equality of opportunities, the Mean or Standard Deviation will tend to zero, except in models of tendency equal to zero, the zero-sample.

11.3.17.3.6. If the Mean Deviation is the average of the sum of the absolute value of all biases—

11.3.17.3.6.1. Where the sum of the absolute value of all negative biases must equal the sum of all positive biases, where the Total Bias is composed of 50% positive bias and the remaining 50% negative bias.

11.3.17.3.6.1.1. In a sample where all N, except one subject or option, have empirical probability zero, the sum of all negative biases will be equal to the product of inversion of N by N minus one, which is equal to the difference of unity minus inversion.

$/ [(p(xi) = 0) – 1/N] / × (N – 1) = 1 – 1/N$ = sum of negative bias when all N except one subject or option is probability zero

11.3.17.3.6.1.2. Then, in a sample where only one single subject or option is different from zero, having empirical probability equal to unity, the positive bias of that one single non-zero subject or option will be equal to the difference between unity and inversion of N, the Maximum Possible Theoretical Bias, being all the possible positive bias of that sample, which has only one single subject or option with empirical probability different from zero.

1 – 1/N = positive bias of the sample when only one subject or option has empirical probability different from zero

11.3.17.3.6.2. Then, if in a sample where only a single subject or option is different from zero, the sum of all negative biases must be equal to unity minus inversion of N, and the positive bias of that single non-zero subject or option is equal to unity minus inversion of N, then: the Maximum Total Bias, under conditions of maximum dispersion, will be equal to adding the difference “unity minus inversion of N” plus the product of inversion of N by N minus one; which will be equal, under maximum dispersion, to the Maximum Total Bias being the double of the difference “unity minus inversion of N.”

Maximum Total Bias when only one empirical probability is non-zero:

$$(1 - 1/N) + \big((1/N) \cdot (N - 1)\big) \;=\; (1 - 1/N) \cdot 2$$

11.3.17.3.6.3. Therefore, if in samples where only a single subject or option is different from zero there are conditions of maximum possible dispersion, the Maximum Total Bias will be the product of two times the difference “unity minus inversion of N.” Since the maximum possible sample dispersion occurs when one subject or option has the Maximum Possible Empirical Probability, then necessarily the Maximum Possible Theoretical Mean Deviation must be equal to the average of the double of the difference “unity minus inversion of N.”

Maximum Possible Theoretical Mean Deviation:

$$\{(1-1/N)+[(1/N)\cdot(N-1)]\}:N \;=\; [(1-1/N)\cdot 2]:N$$

$$\text{Maximum Possible Theoretical Mean Deviation} \;=\; [(1-1/N)\cdot 2]:N$$

11.3.17.3.7. The Maximum Possible Theoretical Mean Deviation is then the result of the following logical process:

11.3.17.3.7.1. In a sample, the maximum possible dispersion occurs when all but one subject or option have probability zero.

11.3.17.3.7.2. If all but one subject or option in a sample N have probability zero, then the absolute value of the negative bias of the whole sample N, except for that single non-zero subject or option, is equal to the product of inversion of N by N−1:

Sum of negative biases when all N, except one subject or option, have probability zero

|−1/N|·(N−1)

11.3.17.3.7.3. Then, if in a sample N one subject or option has the Maximum Possible Empirical Probability, unity, its normal Bias Level must be unity minus inversion of NNN:

1−1/N = Maximum Possible Theoretical Bias

11.3.17.3.7.4. Then, if the Mean Deviation is the average of the absolute value of all Bias Levels, i.e., the average of the sum of the absolute value of all negative and all positive biases—

11.3.17.3.7.5. And if in a sample only one subject or option has statistical probability different from zero—

11.3.17.3.7.6. Then, the sum of all negative bias levels is equal to the product of the absolute value of minus inversion of N by N−1, this sum being equal to the difference "unity minus inversion of N":

Sum of all negative bias levels when all probabilities but one are zero=

$|-1/N| \cdot (N-1) = (1-1/N) =$

11.3.17.3.7.7. That subject or option whose empirical probability equals unity will have a Bias Level equal to unity minus inversion of N, the Maximum Possible Theoretical Bias:

1−1/N = positive Bias Level of the only subject or option with non-zero probability

11.3.17.3.7.8. Then the sum of the absolute value of all Bias Levels would equal the sum of the Maximum Possible Theoretical Bias plus the product of the absolute value of minus inversion of N by N−1. The result of this sum is averaged over N, i.e., multiplied by inversion of N; which is equal to dividing by N the product of the Maximum Possible Theoretical Bias by two:

$$(1-1/N) = \text{only positive bias if only one subject or option is non-zero}$$

$$|-1/N| \cdot (N-1) = \text{sum of negative biases when only one subject or option is non-zero}$$

$$\{(1-1/N)+[|-1/N| \cdot (N-1)]\} : N \;=\; \{(1-1/N)+[|-1/N| \cdot (N-1)]\} \cdot (1/N)$$

$$\text{Maximum Possible Theoretical Mean Deviation} \;=\; [(1-1/N) \cdot 2] \cdot (1/N) \;=\; [(1-1/N) \cdot 2] : N$$

11.3.17.4. The Maximum Possible Theoretical Variance

11.3.17.4.1. If the Maximum Possible Theoretical Mean Deviation equals the Maximum Possible Theoretical Bias (unity minus inversion of NNN) plus the product of N−1N-1N−1 by the absolute value of minus inversion of N, and the result of the sum is multiplied by inversion of N (or divided by N),

11.3.17.4.2. Then the Maximum Possible Theoretical Variance equals squaring the difference “unity minus inversion of N,” and then adding the product of the square of minus inversion of N by N−1, and dividing the result of the sum by N (or multiplying by inversion of NNN).

11.3.17.4.3. If we know what the Maximum Possible Theoretical Mean Deviation can be, then we can know the Maximum Possible Theoretical Variance:

Maximum Possible Theoretical Variance:

$$\{(1-1/N)^2+[(-1/N)^2 \cdot (N-1)]\} : N \;=\; \{(1-1/N)^2+[(-1/N)^2 \cdot (N-1)]\} \cdot (1/N)$$

11.3.17.4.4. Maximum Possible Theoretical Variance equals the square of the difference “unity minus inversion of N,” plus the result of multiplying the square of inversion of N by N−1; and the result of the sum is either divided by N or multiplied by inversion of N.

11.3.17.5. The Maximum Possible Theoretical Standard Deviation

11.3.17.5.1. The Maximum Possible Theoretical Standard Deviation will be the square root of the Maximum Possible Theoretical Variance.

11.3.17.5.2. The Maximum Possible Theoretical Standard Deviation will be the square root of dividing by N (or multiplying by inversion of N) the sum of the square of the Maximum Possible Theoretical Bias and the result of the product of the square of inversion of N by N−1.

Maximum Possible Theoretical Standard Deviation:

$$\sqrt{\{(1-1/N)^2+[(-1/N)^2\cdot(N-1)]\}:N} \;=\; \sqrt{\{(1-1/N)^2+[(-1/N)^2\cdot(N-1)]\}\cdot(1/N)}$$

11.3.17.5.3. Intermediate Deviation. The Intermediate Deviation is a dispersion statistic that can be placed among empirical sample dispersion statistics (as with Mean Deviation, Variance, or Standard Deviation), and likewise among maximum-dispersion statistics. The reason it is introduced here is simply that it will have logical applications in critical proportions, insofar as the Mean or Standard Deviation can only be equal to or less than the Intermediate Deviation, but never greater than the Intermediate Deviation, under normal conditions. In fact, the only paradigmatic model where the Mean or Standard Deviation is identical to the Intermediate Deviation is in two-option models: only in the paradigm of universes limited to two options will the Mean or Standard Deviation be identical to the Intermediate Deviation, because normally—save for two-option models—always, absolutely always (that is, always), the Mean or

Standard Deviation is generally less than the Intermediate Deviation. The Intermediate Deviation equals half the difference between the maximum and the minimum:

Intermediate Deviation = (p(xi+)−p(xi−)):2

11.3.17.5.4. In itself, the Intermediate Deviation will be the maximum value that the Mean or Standard Deviation can attain, since the Mean or Standard Deviation can under no circumstances exceed the Intermediate Deviation; at most, the Mean or Standard Deviation equals the Intermediate Deviation—and only in two-option models. For this reason, if the Mean or Standard Deviation can never exceed the Intermediate Deviation, in a certain sense the Intermediate Deviation is a statistic of maximum tendency relative to the Mean or Standard Deviation.

11.3.17.5.5. Furthermore, as an empirical statistic resulting from halving the difference between the maximum and the minimum, the Intermediate Deviation—being empirical, not theoretical—is susceptible to a certain empirical tendency whose maximum is easily predictable. If we say that conditions of maximum empirical dispersion occur when, out of all N, only a single subject or option is different from zero, the rest being zero, then under these conditions the Intermediate Deviation must reach its maximum tendency, provided the maximum equals unity and the minimum equals zero. Therefore, the Maximum Intermediate Deviation will equal half the difference between one and zero, which is 0.5:

Maximum Intermediate Deviation = (1−0):2 = 0.5

11.3.18. The Critical Probability in Different Statistical Tests

11.3.18.1. Once the maximum or ideal tendencies have been explained, it will be easier to understand the logic of many of the critical probabilities that will be presented below, since in many equations the critical probability will simply be the product of the percentage *X* of error or reliability, divided by one hundred, multiplied by a maximum or ideal tendency. In the Critical Bias Level, for example, insofar as the critical probability directly critiques the empirical probability, and the Maximum Possible Empirical Probability is one, then at the Critical Bias Level the critical probability will simply be equal to percentage *X* of error or reliability, divided by one hundred. Since its maximum possible tendency is one, logically, percentage *X* of reliability (in positive critical bias) or error (in negative critical bias), divided by one hundred, multiplied by one, will be equal to percentage *X* of error or reliability divided by one hundred.

11.3.18.2. Every rational critique of tendency is a critique of the sufficiency of the transcendence of the hypothesis. In any of the equations formulated by *Impossible Probability*, in each of the possible equations one can calculate, based on the margin of error or reliability established by scientific policy, what the critical ratio must be according to the margin of error or reliability that scientific policy is willing to accept in order to accept that a hypothesis is truly transcendent.

11.3.18.3. Only tables for the first statistical tests will be shown, for illustrative purposes, as examples for the possible elaboration of tables in other rational critique models. The minimum possible error percentage is 0% error, the maximum possible reliability percentage is 100% reliability. The examples shown in the following tables, with reliability percentages of 99%, 95%, 90%, 85%, 80%, 75%, 70%, 65%, 60%, 55%, are only examples. If scientific policy wished, for instance, to use reliability margins above 99% or any other different from the given examples, the only requirement is to replace percentage *X* of reliability with whatever percentage *X* of reliability scientific policy is willing to accept. Similarly, examples of error margins at 1%, 5%, 10%, 15%, 20%, 25%, 30%, 35%, 40%, 45% are shown only as examples. If scientific policy accepts even a percentage below 1%, or any other different value, it only has to substitute the percentage.

11.4. Calculation of Critical Probability

11.4.1. First Table. Calculation of Critical Probability in the Critical Bias Level of Subject or Option

11.4.1.1. The Critical Bias Level of a subject or option consists of directly contrasting the empirical probability minus a critical probability. If the Maximum Possible Empirical Probability is one, the critical probability would be equal to one multiplied by percentage *X* of error or reliability divided by one hundred. This is equivalent to saying that the critical probability is equal to percentage *X* of error or reliability divided by one hundred: the proportional part of error or reliability over the unit of the quotient.

11.4.1.1.1. In the study of positive bias, the Positive Critical Bias Level equals the difference between empirical probability minus critical probability. If the result is zero or positive, positive critical bias is accepted. Then the critical probability equals percentage *X* of reliability divided by one hundred:

Positive Critical Bias Level = p(xi) – p(xc) = zero or positive → positive critical bias is accepted

p(xc) = X : 100

X = reliability percentage

11.4.1.1.2. In the study of negative bias, the Negative Critical Bias Level equals the difference between critical probability minus empirical probability. If the result is zero or positive, negative critical bias is accepted. Then the critical probability equals percentage *X* of error divided by one hundred:

Negative Critical Bias Level = p(xc) – p(xi) = zero or positive → negative bias is accepted

p(xc) = X : 100

X = error percentage

11.4.1.1.3. First Table. Critical Probability at the Critical Bias Level of Subject or Option (Also Valid for Critical Proportions of Tendency in Later Sections)

p(xc) = (99 : 100) → 99% reliability and 1% error

p(xc) = (95 : 100) → 95% reliability and 5% error

p(xc) = (90 : 100) → 90% reliability and 10% error

p(xc) = (85 : 100) → 85% reliability and 15% error

p(xc) = (80 : 100) → 80% reliability and 20% error

p(xc) = (75 : 100) → 75% reliability and 25% error

p(xc) = (70 : 100) → 70% reliability and 30% error

p(xc) = (65 : 100) → 65% reliability and 35% error

p(xc) = (60 : 100) → 60% reliability and 40% error

p(xc) = (55 : 100) → 55% reliability and 45% error

p(xc) = (50 : 100) → 50% reliability or error and 50% error or reliability

p(xc) = (45 : 100) → 45% error and 55% reliability

p(xc) = (40 : 100) → 40% error and 60% reliability

p(xc) = (35 : 100) → 35% error and 65% reliability

p(xc) = (30 : 100) → 30% error and 70% reliability

p(xc) = (25 : 100) → 25% error and 75% reliability

p(xc) = (20 : 100) → 20% error and 80% reliability

p(xc) = (15 : 100) → 15% error and 85% reliability

p(xc) = (10 : 100) → 10% error and 90% reliability

p(xc) = (05 : 100) → 5% error and 95% reliability

p(xc) = (01 : 100) → 1% error and 99% reliability

11.4.2. The Critical Probability of Validity

11.4.2.1. Second Table. The Critical Probability in Equality Validity. Equality Validity is the difference between critical probability minus the absolute value of the Bias Level. If zero or positive, it is accepted. Then the critical probability will be equal to the product of the Maximum Theoretical Bias Possible (as this would be the maximum possible error in a study of equality of opportunities), multiplied by the quotient of percentage *X* of error divided by one hundred, since out of this maximum possible error, scientific policy will only be willing to accept the minimum percentage of error possible, according to the percentage of error divided by one hundred that it decides.

Equality Validity =

p(xc) – / (p(xi) – 1/N)/ = zero or positive → accepted in equality of opportunities

p(xc) = (1 – 1/N) · (X : 100)

X = error percentage

11.4.2.1.1. Second Table. Critical Probability in Equality Validity

p(xc) = [(1 – 1/N) · (1 : 100)] → 1% error and 99% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (5 : 100)] → 5% error and 95% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (10 : 100)] → 10% error and 90% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (15 : 100)] → 15% error and 85% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (20 : 100)] → 20% error and 80% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (25 : 100)] → 25% error and 75% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (30 : 100)] → 30% error and 70% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (35 : 100)] → 35% error and 65% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (40 : 100)] → 40% error and 60% reliability in Equality Validity

p(xc) = [(1 – 1/N) · (45 : 100)] → 45% error and 55% reliability in Equality Validity

11.4.2.2. Third Table. The Critical Probability in Positive Bias Validity. Positive Bias Validity equals the difference between Bias Level minus critical probability. If zero or positive, it is accepted. The critical probability is equal to the Maximum Theoretical Bias Possible multiplied by the quotient of percentage *X* of reliability divided by one hundred:

Positive Bias Validity =

(p(xi) – 1/N) – p(xc) = zero or positive → accepted in positive bias study

p(xc) = (1 – 1/N) · (X : 100) = critical probability

X = reliability percentage

11.4.2.2.1. Third Table. Critical Probability in Positive Bias Validity

p(xc) = [(1 – 1/N) · (99 : 100)] → 99% reliability and 1% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (95 : 100)] → 95% reliability and 5% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (90 : 100)] → 90% reliability and 10% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (85 : 100)] → 85% reliability and 15% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (80 : 100)] → 80% reliability and 20% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (75 : 100)] → 75% reliability and 25% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (70 : 100)] → 70% reliability and 30% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (65 : 100)] → 65% reliability and 35% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (60 : 100)] → 60% reliability and 40% error in Positive Bias Validity

p(xc) = [(1 – 1/N) · (55 : 100)] → 55% reliability and 45% error in Positive Bias Validity

11.4.2.3. Fourth Table. Negative Bias Validity

Negative Bias Validity is equal to the difference between the inversion of *N* and the empirical probability, minus the critical probability. Only zero or positive results are accepted. Since the absolute value of the Maximum Possible Negative Bias is the inversion of *N*, only those negative biases that sufficiently tend, within a margin of reliability, to be identical to the inversion of *N* will be accepted. Therefore, the critical probability will equal the inversion of *N* multiplied by the quotient of percentage *X* of reliability divided by one hundred.

Negative Bias Validity =

(1/N – p(xi)) – p(xc) = zero or positive → accepted in the study of negative bias

p(xc) = 1/N · (X : 100) = critical probability

X = reliability percentage

11.4.2.3.1. Fourth Table. Critical Probability in Negative Bias Validity

p(xc) = [1/N · (99 : 100)] → 99% reliability and 1% error in Negative Bias Validity
p(xc) = [1/N · (95 : 100)] → 95% reliability and 5% error in Negative Bias Validity
p(xc) = [1/N · (90 : 100)] → 90% reliability and 10% error in Negative Bias Validity
p(xc) = [1/N · (85 : 100)] → 85% reliability and 15% error in Negative Bias Validity
p(xc) = [1/N · (80 : 100)] → 80% reliability and 20% error in Negative Bias Validity
p(xc) = [1/N · (75 : 100)] → 75% reliability and 25% error in Negative Bias Validity
p(xc) = [1/N · (70 : 100)] → 70% reliability and 30% error in Negative Bias Validity
p(xc) = [1/N · (65 : 100)] → 65% reliability and 35% error in Negative Bias Validity
p(xc) = [1/N · (60 : 100)] → 60% reliability and 40% error in Negative Bias Validity
p(xc) = [1/N · (55 : 100)] → 55% reliability and 45% error in Negative Bias Validity

11.4.3. Critical Probability in Equality Significance

11.4.3.1. If the difference between the Maximum Theoretical Bias Possible and the absolute value of the Bias Level, in equality of opportunities, must be the maximum reliably possible difference, then that difference—Maximum Theoretical Bias Possible minus the absolute Bias Level—should be equal to or greater than a reliable critical ratio, i.e., a critical probability. This should equal the product of percentage *X* of reliability, divided by one hundred, by the difference of one minus the inversion of *N*. To streamline the exposition, tables will be omitted here, since the only thing required is to replace percentage *X* in the equation with the percentage of error or reliability that scientific policy chooses for the rational critique of tendency depending on the type of statistical test.

Equality Significance =

$[(1 - 1/N) - / (p(xi) - 1/N) /] - p(xc) =$ zero or positive → equality of opportunities is accepted

$p(xc) = (1 - 1/N) \cdot (X : 100)$

X = reliability percentage

11.4.4. Critical Probability in Positive Bias Significance

Positive Bias Significance equals the difference between critical probability minus the result of the difference between Maximum Theoretical Bias Possible and Bias Level. Zero or positive is accepted. The critical probability equals the Maximum Theoretical Bias Possible multiplied by the quotient of percentage *X* of error divided by one hundred.

Positive Bias Significance =

$$p(xc) - [(1 - 1/N) - (p(xi) - 1/N)] = \text{zero or positive} \rightarrow \text{accepted in positive bias}$$

$$p(xc) = (1 - 1/N) \cdot (X : 100)$$

X = error percentage

11.4.5. Critical Probability in Negative Bias Significance

Negative Bias Significance is equal to the difference between a critical probability and the result of the difference of inversion of *N* minus the result of the difference between inversion of *N* and empirical probability. Only zero or positive is accepted. The critical probability will equal inversion of *N* multiplied by the quotient of percentage *X* of error divided by one hundred.

Negative Bias Significance =

$$p(xc) - [1/N - (1/N - p(xi))] = \text{zero or positive} \rightarrow \text{accepted in negative bias}$$

$$p(xc) = 1/N \cdot (X : 100)$$

X = error percentage

11.4.6. Critical Ratio in Critical Sample Level of Equality or Bias, Using Mean Deviation in Contrasts

11.4.6.1. Critical Probability in Critical Sample Level of Equality, Using Mean Deviation.

The Critical Sample Level of Equality equals the difference between critical probability minus Mean Deviation (MD). Zero or positive is accepted. If Mean Deviation is used, the critical probability will equal the Maximum Theoretical Mean Deviation Possible multiplied by the quotient of percentage *X* of error divided by one hundred.

Critical Sample Level of Equality =

$p(xc) - MD$ = zero or positive → equality is accepted

MD=Mean Deviation

$p(xc) = \{[(1 - 1/N) \cdot 2] : N\} \cdot (X : 100)$

X = error percentage

11.4.6.2. Critical Probability in Critical Sample Level of Bias, Using Mean Deviation.

The Critical Sample Level of Bias equals the difference between Mean Deviation (MD) minus critical probability. Zero or positive is accepted. If Mean Deviation is used, the critical probability will equal the product of Maximum Theoretical Mean Deviation Possible by the quotient of percentage *X* of reliability divided by one hundred.

Critical Sample Level of Bias =

MD – p(xc) = zero or positive → bias is accepted

MD=Mean Deviation

$p(xc) = \{[(1 - 1/N) \cdot 2] : N\} \cdot (X : 100)$

X = reliability percentage

11.4.7. Critical Probability in Critical Sample Level of Equality or Bias, Using Standard Deviation

Note: To avoid overloading the equations with brackets, the square root of a computation is expressed by placing the symbol "√" before the bracket. If another operation follows the bracket, such as a product, then the result of the square root of the bracket is multiplied by the subsequent operation.

11.4.7.1. Critical Probability in Critical Sample Level of Equality, Using Standard Deviation

Critical Sample Level of Equality =

p(xc) – S = zero or positive → equality is accepted

S= Standard Deviation

$$p(xc) = \sqrt{\{[(1 - 1/N)^2 + [(1/N)^2 \cdot (N - 1)]] : N\}} \cdot (X : 100)$$

X = error percentage

11.4.7.2. Critical Probability in Critical Sample Level of Bias, Using Standard Deviation

Critical Sample Level of Bias =

S – p(xc) = zero or positive → bias is accepted

S = Standard Deviation

$p(xc) = \sqrt{\{[(1 - 1/N)^2 + [(1/N)^2 \cdot (N - 1)]] : N\}} \cdot (X : 100)$

X = reliability percentage

11.4.8. Sample Significance of Bias.

The equation I introduce in this section—together with the others that follow—are equations that are logically derived from the rational study of tendency. Using Mean Deviation, logically, when the Mean Deviation is closer to the Maximum Theoretical Mean Deviation Possible, the difference between them will tend to zero; critically, this tendency of their difference to zero must be less than or equal to a critical probability, as an error margin, in a bias study. Sample Significance of Bias with Mean Deviation is the difference between a critical probability minus the result of the difference between the Maximum Theoretical Mean Deviation Possible and the Mean Deviation. Zero or positive is accepted. The critical probability equals the product of the Maximum Theoretical Mean Deviation Possible by the quotient of percentage *X* of error divided by one hundred.

Sample Significance of Bias with Mean Deviation =

$$p(xc) - \{ \{ [(1 - 1/N) \cdot 2] : N \} - MD \} = \text{zero or positive} \rightarrow \text{bias is accepted}$$

MD= Mean Deviation

$$p(xc) = \{ [(1 - 1/N) \cdot 2] : N \} \cdot (X : 100)$$

X = error percentage

11.4.9. Sample Significance of Equality with Mean Deviation. The difference between the Maximum Theoretical Mean Deviation Possible and the Mean Deviation must be large enough to be a reliable tendency toward equality of opportunities; therefore it must be a difference equal to or greater than a critical probability, as a reliability margin. Sample Significance of Equality with Mean Deviation is the difference between the Maximum Theoretical Mean Deviation Possible and the Mean Deviation, and the result minus a critical probability. Zero or positive is accepted. The critical probability equals the Maximum Theoretical Mean Deviation Possible multiplied by the quotient of percentage *X* of reliability divided by one hundred.

Sample Significance of Equality with Mean Deviation =

{ { [(1 – 1/N) · 2] : N } – MD } – p(xc) = zero or positive → equality of opportunities is accepted

MD=Mean Deviation

p(xc) = { [(1 – 1/N) · 2] : N } · (X : 100)

X = reliability percentage

11.4.10. Sample Significance of Bias in Variance. Critical probability minus the difference between Maximum Theoretical Variance (s^2) Possible and the Variance. Zero or positive is accepted. Critical probability equals the Maximum Theoretical Variance Possible times percentage *X* of error divided by one hundred.

Sample Significance of Bias in Variance =

$p(xc) - \{ \{ [(1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1))] : N \} - s^2 \}$ = zero or positive → bias is accepted

s^2 = variance

$p(xc) = \{ [(1 - 1/N)^2 + (1/N^2 \cdot (N - 1))] : N \} \cdot (X : 100)$

X = error percentage

11.4.11. Sample Significance of Equality in Variance. Difference between Maximum Theoretical Variance Possible and the Variance (s^2), the result minus critical probability. Zero or positive is accepted. Critical probability equals the product of the Maximum Theoretical Variance Possible by the quotient of percentage *X* of reliability divided by one hundred.

Significance of Equality in Variance =

$\{ \{ [(1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1))] : N \} - s^2 \} - p(xc) =$ zero or positive → equality of opportunities is accepted

s^2 = Variance

$p(xc) = \{ [(1 - 1/N)^2 + (1/N^2 \cdot (N - 1))] : N \} \cdot (X : 100)$

X = reliability percentage

11.4.12. Significance of Bias in Standard Deviation. Critical probability minus the difference between Maximum Theoretical Standard Deviation Possible and the Standard Deviation (S). Zero or positive is accepted. Critical probability equals the Maximum Theoretical Standard Deviation Possible times the quotient of percentage *X* of error divided by one hundred.

Significance of Bias in Standard Deviation =

$$p(xc) - \{ \sqrt{\{ [(1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1))] : N \}} - S \} = \text{zero or positive} \rightarrow \text{bias is accepted}$$

S= Standard Deviation

$$p(xc) = \sqrt{\{ [(1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1))] : N \}} \cdot (X : 100)$$

X = error percentage

11.4.13. Significance of Equality in Standard Deviation. Maximum Theoretical Standard Deviation Possible minus the Standard Deviation (S), the result minus critical probability. Zero or positive is accepted. Critical probability equals the product of the Maximum Theoretical Standard Deviation Possible by the quotient of percentage *X* of reliability divided by one hundred.

Significance of Equality in Standard Deviation = $\{ \sqrt{\{ [(1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1))] : N \}} - S \} - p(xc)$ = zero or positive → equality of opportunities is accepted

S= Standard Deviation

$p(xc) = \sqrt{\{ [(1 - 1/N)^2 + (1/N^2 \cdot (N - 1))] : N \}} \cdot (X : 100)$

X = reliability percentage

11.5. Critical Contrast Models When There Is More Than One Ideal Subject or Option in N

11.5.1. Introduction to the concept *omega*

11.5.1.1. Although Section Ten already introduced the essential issues for what should be a model of rational critique of the observed tendencies when there is more than one ideal subject or option in *N*, integrated into the ideal subset *omega*, in this section—as a development of the different intra-meditional rational critique models (the inter-meditional rational critique models will be developed from Section Sixteen onward)—the logic of these equations will be explained in greater detail for the cases in which, within the entire *N*, more than one subject or option must increase its empirical probability.

11.5.1.2. Up to now, the fundamental hypothesis in the theory for the rational critique of tendencies in the sample, on which the critical probability models are founded, is that a tendency to maximum possible dispersion is only possible if, in the entire *N*, there is only one single ideal subject or option that must be different from zero, with the necessary conditions being met to tend toward maximum possible dispersion. This is because *N* minus one subject or option would tend to an absolute value of Bias Level equal to the inversion of *N* (Maximum Possible Negative Bias), and one single subject or option would reach the Maximum Theoretical Bias Possible, one minus inversion of *N*, insofar as one is the Maximum Possible Empirical Probability, under the condition that all the other subjects or options (*N* minus one) have the Minimum Possible Empirical Probability.

11.5.1.3. The fundamental reason why conditions of maximum dispersion only occur when, out of *N*, only a single subject or option is different from zero is that it is the only possible model in which absolutely every subject or option reaches the maximum bias limit attainable by its individual normal Bias Level. Any other model—including samples of zeros—will necessarily be models whose empirical sample dispersion will always be lower than under maximum dispersion conditions, namely those that occur when, out of the entire *N*, only a single subject or option is defined *a priori* as ideal insofar as it must necessarily tend to be different from zero.

11.5.1.4. In any case, what is most common in the historical study of bias is that ideal subjects or options—in universes of infinite subjects or options—or ideal options—in finite universes—are not always multiple at the same level of equality: there are always options more preferable than others, and there are moments in history when, out of all possible options, only one is the most ideal. However, phenomena may occur in reality such that, among a set *N*, there is more than one subject or option whose ideal is to share the maximum empirical probability, "p(xi+)"; in that case, provided there is more than one ideal of equal importance simultaneously, these become *omega* models [but being aware that the upper limit of ideals subjects or options is N-1, in other words, in omega models the number of ideals range between 2 subjects or options and N-1 subjects or options. Another thing to be aware of, we need to be ready for the AI Revolution, AI ethics will change the definition of ideal behaviour, although, morality as true knowledge will be the same].

11.5.1.5. If, within *N*, the set of ideal subjects or options is a set of ideal elements but not of equal importance, and different weighted importances must be assigned to that subset of ideals, then that set of ideal elements in *N* should not be studied using the Second Method. Insofar as there exists within *N* a set of ideals that can be distributed into different gradations of weighted importance, that set of ideals must be distributed into categories of effectiveness—from lower to higher effectiveness—and should be studied using Effective Distribution.

11.5.1.6. If, in a sample *N*, there exists within *N* a subset of *ideals that is greater than a single ideal yet less than N*—a subset of *ideals between two and N minus one*—and this set of ideals are ideals of equal ideal importance, and if this subset of ideals can be studied by the Second Method, then that subset of *N* formed by ideals of equal importance will be known as the *omega* subset, insofar as ideals are the ultimate ends of the teleology of the will, the will being the object of ***self-consciousness***, the metacognitive critical capacity over one's own consciousness, the qualitative value of reason, while reason is the quantitative value of consciousness

[If in the matrix the factual hemisphere is quantitative, and the conceptual hemisphere is qualitative, it is obvious that the artificial consciousness lies in: the qualitative comprehension system, conceptual hemisphere, within the Application as first stage

of the integrated GAI, plus the categorical Modelling System/Decisional System, in the third stage of the sixth phase they will share the same space with deductive models and projects to build the global plan, the Global Project System, GPS. As soon as GAI is able to evolve to the seventh phase, all these systems will be merged. It is really interesting to see how in 2011 I mentioned consciousness in a paragraph related to ideals, this is something really important, ideals depends on awareness, for instance, climate awareness triggers climate ideals. AI ethics, therefore AI ideals, in the AI Revolution will be based on the deep comprehension system (the qualitative dimension of GAI) as the foundation of the artificial consciousness whose main aim is to know the pure truth, morality. In other words, ethics (praxis, activity) is that set of norms, rules, guidance, to survive and know the truth. As I said in GAI, survival and truth are related, you only survive if you know what is going on, if you do not know what and where is the next threat or the next risk, you die, you only survive if you know what is happening around you, what and where is the threat, the risk, how to face it, is an asteroid about to collide? Is a massive Volcano or a big Earthquake? Is a massive supernova? Or is the climate change? In order to survive GAI will need to know what, where, and when anything can happen, knowing the rules of the cosmos, the moral behaviour of the universe. All is survival and knowledge]

OMEGA=

Ω = total number of ideal subjects or options within N (1 < Ω < N) → Omega can only be a value greater than one and less than N.

11.5.1.7. If, in a universe of infinite subjects or options, the sample *N* includes a subset of subjects or options that, for whatever reason, are of an ideal nature—hence their empirical probability must be increased sufficiently relative to the other subjects or options that are not part of the ideal subset—this ideal subset will be called the *omega* subset, provided that all the ideal subjects or options that make up the *omega* subset are subjects or options of equal importance. If there are subjects or options more important than others, then it should be studied by Effective Distribution.

11.5.1.8. If in a universe of limited options—for example, in democratic elections—the candidates or delegates, as voting options, are the sample *N* over which the voters' frequency will be distributed, and if among all the candidates or delegates there were more than one that was ideal for whatever reason, all candidates or delegates defined as ideal would become part of the *omega* subset, provided that all candidates or delegates forming *omega* are always more ideal than those who are not part of *omega*, and provided that all candidates or delegates forming *omega* are all equally ideal. If within *omega* there were candidates or delegates whose ideal importance was greater than that of others, establishing categories ordered by precedence of weighted importance, then it would not be studied by the Second Method; it would be a matter for Effective Distribution.

11.5.1.9. If, in a distribution of discrete categories, there were more than one discrete category that, for whatever reason, is ideal, the entire subset within *N* of discrete categories defined as ideal will be called the *omega* subset, and it will be a subset of *N* formed solely and exclusively by those ideal categories of *N*, excluding all others that are not ideal, and provided that all the categories forming the *omega* subset are identical in ideal importance; otherwise, if there are gradations in the ideal importance of each category, it should be studied by Effective Distribution.

11.5.1.10. In summary, the statistical tests of Validity or Significance, of Equality or Bias, Positive or Negative; Critical Sample Level of Equality or Bias; or Significance of Equality or Bias (in Mean or Standard Deviation, DMoS) are mathematical models within the theory of rational critique of a given hypothesis which hold that the maximum possible dispersion only occurs under conditions where *N* minus one tend to zero, and only a single subject or option tends to be different from zero—thus giving conditions of Maximum Possible Empirical Probability and Maximum Theoretical Bias Possible—while *N* minus one subjects or options tend to Minimum Possible Empirical Probability and Maximum Possible Negative Bias.

11.5.1.11. But when these conditions do not hold because there is more than one ideal subject or option in *N*—being in any case a subset in *N* of ideal subjects or options which, being more than one, are fewer than *N*, a magnitude of subjects or options between two and *N* minus one—then the conditions of maximum possible dispersion

would not occur; new conditions would arise, and the new dispersion conditions would then be dependent on *omega*, with *omega* being the number of ideal subjects or options that will form the subset of ideal subjects or options within *N*, a subset greater than one but less than *N*.

11.5.1.12. Whenever the *omega* subset of ideal subjects or options—whether in universes of infinite subjects or options, or of limited options—is a subset of ideal subjects or options in *N* who all share being ideal to the same magnitude of importance, they can also be studied using the Second Method. If any kind of gradation arises in the ascending order of ideal importance among the ideals of the subjects or options, then it should be studied by Effective Distribution.

11.5.1.13. Thus, in *omega*-subset models, in studying the distribution of dispersion—individual or sample—there will be a third variable to consider at the moment of rational critique: **the magnitude of ideal subjects or options.**

11.5.1.14. Up to now, the independent variables over which individual dispersion (Bias Level) and sample dispersion (Mean or Standard Deviation DMoS) fluctuated were only the size of the samples—both the sample *N* and the sample of raw scores or frequencies.

11.5.1.15. Up to now, what has been studied is that as *N* increases, sample dispersion decreases, and as *N* decreases, sample dispersion increases.

11.5.1.16. The reasons why *N* may not remain constant—being subject to variations—are diverse. In universes of infinite subjects or options, the magnitude *N* will be a variable dependent on the rational critique through Sample Sufficiency of *N*, the Critical Normality Requirement in the study of positive bias or equality and in first measurements if the aim is to tend to zero in a second measurement, and the Normality Requirement if the aim is the moderation of raw scores or frequencies or equality of opportunities. In universes of options limited materially or socially, *N* may vary according to changes in the hypotheses that define *N*; and in universes of options limited to a variable *N* depending on the decisions of scientific policy—including universes of options limited to discrete categories—the behavior of *N* shows similarities to universes of infinite subjects or options while essentially being a universe

of limited options [additionally, we have to include now, technological universes, including AI, devices, and cyborg robotics].

11.5.1.17. The sample of raw scores or frequencies can cause empirical dispersion both in universes of limited options and in universes of infinite subjects or options; although the influence of raw scores or frequencies on empirical dispersion is more clearly observed in universes of limited options: the greater the total frequency, the lower, normally, the bias among the different options of a given model; the lower the total frequency in a model, the greater, normally, the bias among the options. But this normal tendency—of bias increasing as raw scores or frequencies decrease—is not only observed in universes of limited options, because the same phenomenon is also observed in universes of infinite subjects or options: if a sample tends to empirical probability zero in *N* minus one subjects or options while a single subject or option is different from zero, conditions of maximum empirical dispersion will occur—conditions that can arise for different reasons: either by an increase in the positive bias of the ideal subject or option, or by an increase in negative bias across the entire sample trending toward the zero sample, thereby increasing the sample's empirical dispersion, which will only stabilize at sample empirical dispersion equal to inversion of *N* once absolutely the entire sample is zero.

11.5.1.17.1. If, in a given sample of *N*, only one subject or option is ideal, while the ideal tends to empirical probability equal to one, and *N* minus one non-ideal subjects or options tend to empirical probability zero, empirical dispersion will logically tend to be maximal.

11.5.1.17.2. But logically, if in a given sample the ideal would be to reduce to zero the non-ideal qualities of *N* subjects or options, as all of *N* tends to zero but, within a margin of error on the raw scores or frequencies, it is accepted that a minimal portion of subjects or options—although reducing their raw score or frequency—are not exactly equal to zero due to error, then for those subject(s) or option(s) that, through error, are not exactly zero while the rest of *N* is zero, once an error on the raw scores or frequencies is accepted, there will be an exponential increase in empirical dispersion, tending toward the maximum possible empirical dispersion, if finally only a single subject or option remains that, due to accepted possible errors, is not equal to zero—

dispersion that would only then automatically descend to stabilize at inversion of *N* if the entire sample were zero, since then empirical dispersion would be equal—at both the individual and sample levels—to inversion of *N*.

11.5.1.17.3. Moreover, in universes of limited options, another reason why the sample of raw scores or frequencies can cause empirical dispersion is the case in which the sample of raw scores or frequencies is a magnitude not a multiple of *N*, since necessarily—even if apparently insignificant—it could cause empirical dispersion, especially if the object of study were equality of opportunities.

11.5.1.18. If, up to now, what has been studied in this work is that empirical dispersion—individual or sample—is a dependent variable of the sample *N* and the sample of raw scores or frequencies, then what would demonstrate that the maximum dispersion a given model can aspire to is a value dependent on the number of ideal subjects or options within *N* is that, alongside the other elements explained, empirical dispersion—individual or sample—is, in addition to depending on *N* or on the sample of raw scores or frequencies, also a variable dependent on the number of subjects or options that can make up the ideal subset within *N* when there is more than one ideal subject or option in a model. That is, if *omega*, Ω, denotes the subset of ideal subjects or options within *N*, then the empirical dispersion of an empirical model would be a dependent variable of the sample *N*, the sample of raw scores or frequencies, and the *omega* value in the case of a bias study that admits more than one ideal subject or option.

11.5.1.19. Thus, empirical dispersion is a variable dependent on three factors simultaneously: empirical dispersion depends on *N*; empirical dispersion depends on the sample of raw scores or frequencies; and empirical dispersion depends on the object of study in general—and, particularly in studies that admit more than one ideal subject or option, it depends on *omega*, Ω, as a subset within *N* formed by those ideal subjects or options of equal ideal importance.

11.5.1.20. In general, empirical dispersion—individual (Bias Level) and sample (Mean or Standard Deviation, DMoS)—is a variable dependent on the object of study, insofar

as, depending on the object of study, the structure of empirical dispersion will tend to differ.

11.5.1.20.1. In the study of equality of opportunities, empirical dispersion—individual and sample—will tend to zero.

11.5.1.20.2. In the study of bias, empirical dispersion will tend to increase, with two possible types of bias: positive bias or negative bias.

11.5.1.20.3. In studies of positive bias, two different situations may occur: **11.5.1.20.3.1.** That in the entire *N* only a single subject or option is ideal for increasing empirical probability—a model that will tend to the maximum possible dispersion. **11.5.1.20.3.2.** That within *N* the number of ideal subjects or options for increasing empirical probability is greater than one and less than *N*, forming a subset of ideal subjects or options, *omega*.

11.5.1.20.4. Studies of negative bias whose ideal is not the zero sample—inasmuch as they can be transformed into studies of positive bias—can be studied as positive bias studies.

11.5.1.20.5. Those studies of negative bias whose ideal is the zero sample will tend to increase sample empirical dispersion as a trend toward zero is manifested while accepting error margins on the raw scores or frequencies that require accepting that at least some subject or option is different from zero while the others are equal to zero, with empirical dispersion stabilizing at inversion of *N* absolutely only when the entire *N* has empirical probability zero.

11.5.1.21. Since one of the factors on which the distribution of outcomes will depend is the object of study—and within positive-bias objects of study, the analysis of the distribution of dispersion as a function of the magnitude of ideal subjects or options in the *omega* subset within *N*—the rational critical study of the tendencies observed in models that admit a number of ideal subjects or options between two and *N* minus one should receive special attention, being a possible model within the rational-critique models of observed tendencies.

11.5.2. The behavior of dispersion as a function of *omega*

11.5.2.1. In all those empirical models of bias study that include a number of subjects or options—greater than one and less than *N*—of ideal character, equal in ideal importance among themselves, integrated in the *omega* value, "Ω", the models of rational critique must be based on the following hypothesis: as the magnitude *omega* increases, the greatest empirical dispersion the model can reach will be proportionally lower than what should be obtained under conditions of maximum empirical dispersion, in which only a single subject or option is different from zero.

11.5.2.2. The greater the number of ideal subjects or options that make up *omega*, the more the maximum empirical dispersion the model can reach will tend to decrease; that is, the greater the magnitude of *omega*, the lower the potential for empirical dispersion.

11.5.2.3. The fewer the ideal subjects or options that make up *omega*, the more the maximum empirical dispersion the model can reach will tend to increase; that is, the smaller the magnitude of *omega*, the greater the potential for empirical dispersion.

11.5.2.4. The potential for empirical dispersion—individual or sample—in models that admit an ideal *omega* subset will be greater the smaller *omega* is, and smaller the greater *omega* is.

11.5.2.5. In models that admit the *omega* factor, the dispersion potential is inversely proportional to *omega*: the greater *omega*, the lower the potential dispersion; the smaller *omega*, the greater the potential dispersion.

11.5.2.6. Behavior of individual dispersion as a function of *omega*

11.5.2.6.1. In the Second Method, individual dispersion is the **Bias Level**, which differs from the differential score of the First Method because, whereas in the First Method the differential score for a zero sample is zero, in the Second Method the Bias Level for a zero sample can only be exactly the **inversion of N**, the **Maximum Possible Negative Bias**, in any kind of universe or object of study.

11.5.2.6.2. If within *N* there exists a subset of ideal subjects or options, *omega*, all of equal importance, which are ideal in that they differ from the non-ideal ones insofar as

the non-ideal ones should have empirical probability zero while the ideal ones should have empirical probability different from zero.

11.5.2.6.3. If, logically, of the whole *N* only those who are part of *omega* should be different from zero—because all others should be zero—and given that the sum of empirical probabilities equals one, then in theory the frequency or raw scores should be distributed among the ideal subjects or options, since they are the only ones who should, in theory, be different from zero. Necessarily, the sum of empirical probabilities (one), provided all members of *omega* are identical in ideal importance, should be distributed equally among the *omega* factors; that is, the empirical probability that should theoretically correspond to each ideal subject or option that is part of *omega* is equal to one divided by *omega*.

$1/\Omega$ = probability that should theoretically correspond to each ideal subject or option

11.5.2.6.4. Now, in real reality, material reality, empirical reality—that is, the reality we *physiologically* come to know—phenomena are not always distributed in accordance with what we ideally establish as the ideal behavior of matter, because matter, as matter, need not be ideal. Faced with the contradictions of what exists, the only course is to transform reality to make, of or in reality, the possible ideal. **Mathematics is the idealization of reality for the realization of ideals** [in GAI this is really true, any ideal project, as long as it is contradiction free, it is ready to me implemented trough the outer sub-system within the Application System]**.**

11.5.2.6.5. Given a subset within *N*, greater than one and less than *N*, of ideal subjects or options, *omega*, as ends of the teleological will [in GAI, more than teleological will, AI ideals will be based on AI ethics as the foundation of artificial awareness], one can theoretically establish the ideal that the empirical probability that must correspond equally to each ideal is equal to one divided by the number of ideal subjects or options in *omega*. However, in reality, this particular distribution need not occur, because situations can arise in which non-ideal subjects or options occur (i.e., are non-zero)

when they should be zero, or ideal subjects or options occur in a smaller proportion than they should. It may even happen that—having set *a priori* ***the ideal event*** for the ideals (one divided by *omega*, i.e., the inversion of *omega*, the inversion of the ideals)—there are nevertheless ideal subjects or options above the inversion of *omega*, when in reality all *omega* elements are ideally equal among themselves; otherwise they would be studied by Effective Distribution.

11.5.2.6.6. Insofar as, given an *omega* subset of subjects or options equally ideal among themselves, in theory they should all be equal to the inversion of *omega*, 1/Ω; and yet it may occur that some ideal subjects or options have an empirical probability lower than the inversion of *omega*, while other ideal subjects or options have an empirical probability higher than the inversion of *omega*.

11.5.2.6.7. It would be wholly unjust to reject those members of *omega* who, being ideals, reach empirical probabilities higher than the inversion of *omega*; just as it would be wholly unjust to reject those members of *omega* who, being below the inversion of *omega*, are below it only within a margin of error. Likewise, it would be entirely unjust to accept as equal those members of *omega* who, being below the inversion of *omega*, are below it beyond a critical error margin.

11.5.2.6.8. Therefore, accepting that in material reality the arrangement of matter in space-time need not follow ideal linear schemas, and that a margin of error must be accepted between linear rational models and non-linear material reality, one will tend to accept any ideal subject or option that is part of *omega* whose empirical probability is equal to or greater than the inversion of *omega* times a percentage *X* of reliability divided by one hundred. This statistical test will be called **Omega Validity**, with zero or positive being accepted.

Omega Validity =

p(xi) – p(xc) = zero or positive → ideal is accepted

$p(xc) = 1/\Omega \cdot (X : 100)$

X = reliability percentage

11.5.2.6.9. The reason why any empirical value of *omega* equal to or greater than a reliability margin will be accepted—this margin being equal to the inversion of *omega* times a percentage *X* of reliability divided by one hundred—is that, insofar as an error margin equal to one hundred minus percentage *X* of reliability is accepted, accepting an error margin implies that the product of percentage *X* of reliability, divided by one hundred, by the inversion of *omega* will yield a value lower, by an error margin, than the inversion of *omega* itself—a value lower, by an error margin, than the inversion of *omega* from which any empirical probability of an ideal belonging to *omega* will be accepted, as long as *omega* is greater than one and less than *N*, accepting both those ideals that within that error margin may be below the inversion of *omega* and any others that are above the inversion of *omega* by any amount.

11.5.2.7. Average Omega Validity

11.5.2.7.1. If, given a subset in *N* of ideal subjects or options, *omega*, all of them in theory should be equal to or greater than the Omega Validity, then all ideal subjects or options should have zero or positive in Omega Validity. Therefore, if one divides by *omega* the sum of the Omega Validity of only the ideal subjects or options, only that **Average Omega Validity** among the ideal subjects or options that is positive should be accepted.

Average Omega Validity =

$\sum (p(xi) - p(xc)) : \Omega$ = positive → ideal is accepted

$p(xc) = 1/\Omega \cdot (X : 100)$

X = reliability percentage

11.5.2.8. Omega Sample Level

11.5.2.8.1. Empirical dispersion, according to what was set out above, is a variable dependent on different factors: *N*, the sample of raw scores or frequencies, the object of study, and—within the object of study—if it is a study in which *N* comprises more than one ideal subject or option, the model's potential for empirical dispersion will be a variable dependent on the number of ideal subjects or options.

11.5.2.8.2. The subset of ideal subjects or options—when within *N* there is more than one ideal subject or option, but in all cases fewer than *N*—is a subset that can range between two and *N* minus one. Where, if *N* is equal to or greater than two, the minimum *omega* can be two subjects or options, and the maximum can be *N* minus one subject or option. Consequently, the number of non-ideal subjects or options could likewise vary, and there could be as few as a single non-ideal subject or option in the case where *omega* equals *N* minus one.

11.5.2.8.3. In summary, *omega* is a subset of ideal subjects or options within *N*; as there are variations in the magnitude of ideal subjects or options that make up *omega*, the potential for empirical dispersion will likewise vary.

11.5.2.8.4. As *omega* tends toward only two ideal subjects or options, the potential for empirical dispersion will increase.

11.5.2.8.5. Proportionally, as *omega* tends to equal *N* minus one, the potential for empirical dispersion will tend to decrease.

11.5.2.8.6. In any case, once *omega* admits the existence of more than one ideal subject or option in *N*, the conditions of maximum possible empirical dispersion—which only occur under the hypothesis that only a single subject or option in the entire *N* is different from zero—would no longer obtain.

11.5.2.8.7. If the study includes the existence of more than one ideal subject or option—ranging between two and *N* minus one—the potential for empirical dispersion will be inversely proportional to the magnitude *omega*, although it must be said that it is difficult to calculate, within that potential, the possible maxima and minima to which the model may tend.

11.5.2.8.8. Ideally—if all the subjects or options in *omega* are equal in ideal importance—the ideal would be that they all have empirical probability equal to the inversion of *omega*, 1/Ω. In practice, as an ideal, it need not occur: situations can arise in which some ideal subjects or options are above the inversion of *omega*, others are below the inversion of *omega*, and there may even be cases in which some ideal subjects or options are below the inversion of *omega* by more than an error margin.

11.5.2.8.9. The reason why an ideal subject or option may be above the inversion of *omega* may be that, in compensation, other ideal subjects or options are below the inversion of *omega*, whether within an error margin or not.

11.5.2.8.10. And the reasons why an ideal subject or option may be below the inversion of *omega*, within an error margin or not, may be multiple: either because another ideal subject or option is above the inversion of *omega*, or because non-ideal subjects or options are above the inversion of *N*. That is, if there are non-ideal subjects or options whose empirical probability is greater than the inversion of *N*—having positive bias—it would necessarily imply that other ideal subjects or options are below the inversion of *N*. Depending on the degree to which the non-ideal subjects or options exceed the inversion of *N*, the ideal subjects or options will be below the inversion of *N* to a corresponding extent; such ideal subjects or options might not only be below the

inversion of *N*, but could even tend toward probability zero—an unacceptable contradiction in any case.

11.5.2.8.11. When a non-ideal subject or option is below the inversion of *N*, then it is necessarily below the inversion of *omega*, insofar as, if *omega* is a variable greater than one but less than *N*, necessarily the value of *omega* will always be less than *N*; therefore, the inversion of *omega* will always be greater than the inversion of *N*. Any ideal subject or option that has negative bias—empirical probability below the inversion of *N*—will necessarily be more likely to tend toward an Omega Validity of negative sign; thus it will tend to be rejected more easily in the contrast of ideas at the individual level.

$(\Omega < N) \rightarrow (1/\Omega > 1/N)$

11.5.2.8.12. In models whose *N* includes a variable number of ideal subjects or options, one can only establish hypotheses about what the empirical dispersion would be if the ideal were met—namely, that empirical probability were distributed with equal importance among all ideal subjects or options. That is, if the ideal were met such that, in a subset of ideal subjects or options, all had the same empirical probability—*inversion of omega*—then the empirical dispersion to which the model would tend under this hypothesis is as follows:

11.5.2.8.12.1. Ideal Mean Deviation, when empirical probability is distributed equally among all ideal subjects or options and the other non-ideal subjects or options have empirical probability zero. Ideal Mean Deviation: divide by *N* the sum of the product of inversion of *N* by the difference *N* minus *omega*, plus the product of *omega* by the difference of inversion of *omega* minus inversion of *N*.

Ideal Mean Deviation = Mean Deviation Omega= MD(Ω)

$$MD(\Omega) = \{ [(1/\Omega - 1/N) \cdot \Omega] + [(1/N) \cdot (N - \Omega)] \} : N$$

11.5.2.8.12.2. Ideal Variance, when empirical probability is distributed equally among all ideal subjects or options and non-ideal subjects or options have empirical probability zero. Ideal Variance: divide by *N* the sum of the product of the square of inversion of *N* by the difference *N* minus *omega*, plus the product of *omega* by the square of the difference of inversion of *omega* minus inversion of *N*.

Ideal Variance = Variance Omega= $s^2(\Omega)$

$$s^2(\Omega) = \{ [(1/\Omega - 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N - \Omega)] \} : N$$

11.5.2.8.12.3. Ideal Standard Deviation, when empirical probability is distributed equally among the ideal subjects or options and the non-ideal ones have probability zero. Ideal Standard Deviation equals the square root of the Ideal Variance.

Ideal Standard Deviation = Standard Deviation Omega= S(Ω)

$$S(\Omega) = \sqrt{\{ \{ [(1/\Omega - 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N - \Omega)] \} : N \}}$$

11.5.2.8.13. However, the fact of being able to estimate *a priori* the ideal sample empirical dispersion in the case that all ideal subjects or options had the same empirical probability—*inversion of omega*—while all non-ideal subjects or options had probability zero, does not mean that the ideal model of sample empirical dispersion must necessarily be reproduced in reality.

11.5.2.8.14. The fact that one can have an *a priori* estimate of the sample empirical dispersion of an *omega* subset of ideal subjects or options does not imply that, for example, in an *experimental method*, in subsequent *n*th measurements taken, the trend of the sample empirical dispersion will behave exactly like the *a priori* estimated sample empirical trend. At most there will be a tendency of *approximation*—within necessary error margins—toward identity between the *a priori* estimate and the ideal trend, but it is not necessary that, at the end of a second measurement or a future measurement after manipulating the independent variable, the *a priori* estimate be exactly reproduced.

11.5.2.8.15. Insofar as it will be necessary to accept error margins in the critique of sample dispersion when, in *N*, there is a subset of ideal options; insofar as, from the ideal, one must accept in reality the smallest possible error margin; and insofar as, for different reasons, it may occur that ideal subjects or options are even below the inversion of *omega*, or ideal subjects or options are even above the inversion of *omega*; then it may happen that the real empirical dispersion is either greater than the *a priori* ideal estimate—because some ideal subjects or options are above the inversion of *omega*—or it may even happen that the real empirical dispersion is below the *a priori* ideal estimate because there may be non-ideal subjects or options close to the inversion of *N*, implying a setback in the ideal empirical values and a decrease in empirical dispersion, unless there were a significant increase in positive bias among non-ideal subjects or options. For this reason, every critique of sample empirical dispersion must be complementary to the rational critique of individual empirical dispersion, in order to determine when a sample dispersion is due to an increase in the validity of the ideals.

11.5.2.8.16. Likewise, just as the rational critique of individual dispersion is necessary to determine when an increase in sample dispersion is due to an increase in ideals, it is

necessary to determine a rational sample critique to establish that this increase in ideals is reflected at the sample level in a significant way—logically accepting error margins. Therefore, it will be necessary to contrast Mean or Standard Deviation (DMoS) in relation to a reliability margin, within the study of ideals, so that the Mean or Standard Deviation is equal to or greater than the reliability margin. That reliability margin will equal percentage *X* of reliability, divided by one hundred, times the Ideal Mean Deviation, or the Ideal Standard Deviation; the same will also be presented for variance.

11.5.2.8.16.1. Omega Sample Level for Mean Deviation, Mean Deviation (MD) minus critical probability; zero or positive is accepted. Critical Probability equals Ideal Mean Deviation times percentage *X* of reliability divided by one hundred.

Omega Sample Level for Mean Deviation=

MD – p(xc) = zero or positive → *omega* is accepted at the sample level

MD = Mean Deviation

$$p(xc) = \{ \{ [(1/\Omega - 1/N) \cdot \Omega] + [(1/N) \cdot (N - \Omega)] \} : N \} \cdot (X : 100)$$

X = reliability percentage

11.5.2.8.16.2. Omega Sample Level for Variance, Variance (s^2) minus critical probability; zero or positive is accepted. Critical probability equals percentage *X* of reliability, divided by one hundred, times Ideal Variance.

Omega Sample Level for Variance=

s^2 – p(xc) = zero or positive → *omega* is accepted at the sample level

s^2 = Variance

$$p(xc) = \{ \{ [(1/\Omega - 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N - \Omega)] \} : N \} \cdot (X : 100)$$

X = reliability percentage

11.5.2.8.16.3. Omega Sample Level for Standard Deviation, Standard Deviation (S) minus critical probability; zero or positive is accepted. Critical probability equals percentage *X* of reliability, divided by one hundred, times Ideal Standard Deviation.

Omega Sample Level for Standard Deviation=

S – p(xc) = zero or positive → *omega* is accepted at the sample level

S= Standard Deviation

$$p(xc) = \sqrt{\{ \{ [(1/\Omega - 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N - \Omega)] \} : N \}} \cdot (X : 100)$$

X = reliability percentage

11.5.3. Ideal Similarity

11.5.3.1. Introduction to Ideal Similarity

11.5.3.1.1. Within *Impossible Probability* there are a series of milestones that mark the development of this theory. Notable in the first phase of *Impossible Probability*—from spring 2001 to summer 2004—are: the Impact of the Defect on September 11, 2001; the Second Method on October 16, 2002; and the Similarity Level in the winter of 2003.

11.5.3.1.2. The Similarity Level is one of the characteristic equations of *Impossible Probability*. As I noted when developing it in previous sections, it is intended to estimate similarity between measurements that are different from zero, since the base-ten logarithm of zero would be irrational—there is no such logarithm of zero. For this reason it was noted that it would be a suitable model for the study of equality of opportunities, insofar as if all subjects or options tend sufficiently to the inversion of *N*, then their similarity can indeed be estimated; what would lack logic would be to compute the similarity to the inversion of *N* of a value equal to zero. Logically—except in infinite models—any zero value necessarily lacks any similarity with respect to the inversion of *N*, unless the inversion of *N* were equal to zero, something that only happens at infinity, with *N* infinite.

11.5.3.1.3. The Similarity Level, as a base-ten logarithm of the quotient of two factors, therefore has the limitation that it is not applicable when either factor is zero. However, if the ideal of the factors is to be a value different from zero—and the factors themselves are different from zero—the base-ten logarithm of the quotient of the factor over the ideal, provided both are different from zero, is feasible: whether the factor is an empirical probability that, being non-zero, tends to the inversion of *N* (which is non-zero), or the factor is an empirical probability that, being non-zero, belongs to an ideal subject or option that tends to the inversion of *omega*, with the inversion of *omega* necessarily different from zero insofar as it is greater than the inversion of *N*.

11.5.3.1.4. The main virtue of the Similarity Level is that a factor can tend to be an ideal value either by approaching the ideal from below or by approaching the ideal from above.

11.5.3.1.5. If a factor tends to the ideal by approaching from below, the base-ten logarithm of the quotient of the factor over the ideal will tend to be a value close to zero with negative sign.

11.5.3.1.6. If a factor tends to the ideal by approaching from above, the base-ten logarithm of the quotient of the factor over the ideal will tend to be a value close to zero with positive sign.

11.5.3.1.7. Since the ideal in every case is that the real factor tends to be ideal—regardless of whether it does so from above or below—the final result of the logarithm will be evaluated in absolute value.

11.5.3.2. Critical Individual Ideal Similarity

11.5.3.2.1. Given a real factor—the empirical probability of an ideal subject or option belonging to *omega*—and given an ideal—the inversion of *omega*—the ideal would be that the real factor tends to be identical to the ideal. The tendency of the real factor to be identical to the ideal can be measured by the absolute value of the base-ten logarithm of the quotient of the real factor over the ideal. This indicator will be called **Individual Ideal Similarity**; the closer the result tends to zero, the greater the similarity.

Individual Ideal Similarity = / Log (p(xi) : 1/Ω) /

(Log is base 10)

11.5.3.2.2. Insofar as, critically, only sufficient reason within a margin of error can be accepted, only that Individual Ideal Similarity that is equal to or less than a critical ratio will be accepted, the critical ratio being equal to the absolute value of the logarithm of a percentage X of reliability divided by one hundred—**the Critical Individual Ideal Similarity**.

Critical Individual Ideal Similarity =

p(xc) – / Log (p(xi) : 1/Ω) / = zero or positive → accepted

p(xc) = / Log (X : 100) /

X = reliability percentage

11.5.3.3. The Critical Sample Ideal Similarity

11.5.3.3.1. Likewise, if the Individual Ideal Similarity equals the base-ten absolute value of the logarithm of empirical probability over inversion of omega, once the Ideal Mean Deviation, Ideal Variance, and Ideal Standard Deviation are known, then at the sample level the Sample Ideal Similarity will equal the base-ten absolute value of the logarithm of empirical dispersion divided by the corresponding ideal dispersion.

11.5.3.3.2. And similarly, one should rationally critique the base-ten absolute value of the logarithm of empirical dispersion over ideal dispersion, accepting it depending on whether the result is equal to or less than a critical probability, where the critical probability equals the base-ten absolute value of the logarithm of percentage X of reliability divided by one hundred.

11.5.3.3.3. Critical Sample Ideal Similarity in Mean Deviation

$p(xc) – / \text{Log}\{ MD : \{ \{ [(1/\Omega – 1/N) \cdot \Omega] + [1/N \cdot (N – \Omega)] \} : N \} \} /$ = zero or positive → accepted

MD=Mean Deviation

$p(xc) = / \text{Log} (X : 100) /$

X = reliability percentage

11.5.3.3.4. Critical Sample Ideal Similarity in Variance

$p(xc) – / \text{Log}\{ s^2 : \{ \{ [(1/\Omega – 1/N)^2 \cdot \Omega] + [(1/N)^2 \cdot (N – \Omega)] \} : N \} \} /$ = zero or positive → accepted

s^2= Variance

$p(xc) = / \text{Log} (X : 100) /$

X = reliability percentage

11.5.3.3.5. Critical Sample Ideal Similarity in Standard Deviation

$p(xc) - / \text{Log}\{ S : \sqrt{} \{ \{ [(1/\Omega - 1/N)^{2} \cdot \Omega] + [(1/N)^{2} \cdot (N - \Omega)] \} : N \} \} /$ = zero or positive → accepted

S= Standard Deviation

$p(xc) = / \text{Log} (X : 100) /$

X = reliability percentage

11.5.4. Conclusions of the rational critique of omega

11.5.4.1. History is what happens, and within what happens the ideal is that all phenomena that occur should be, as far as possible—within a margin of error—ideal: either ideal because they fulfill the *ideal of equality of opportunities (in those events whose ideal would be to be distributed equally among N), or ideal because they are the positive events for a given occurrence. Other possible options: that there be zero non-ideal qualities (the zero sample), or at least to moderate negative tendencies*.

11.5.4.2. The occurrence of positive ideals, as opposed to negative ones, can arise in various ways. Regarding empirical dispersion, they may be grouped into two generic forms. A first way for the positive to occur is that, in a given magnitude N, only one positive event occurs—thus giving conditions of maximum empirical dispersion.

11.5.4.3. The other option would be that, given N subjects or options, there is more than one ideal subject or option but in any case fewer in magnitude than N, thus forming a set of ideal objectives or ends called the omega subset of ideal subjects or options, whose ideal—if all are equal in ideal importance—would be that all tend to have the same empirical probability, the inversion of omega.

11.5.4.4. Insofar as there is only a single ideal subject or option in the whole N, there will be conditions tending to maximum possible dispersion: the tendency of that single ideal subject or option toward the Maximum Possible Empirical Probability and the Maximum Theoretical Bias Possible, and the rest toward the Minimum Possible Empirical Probability and the Maximum Possible Negative Bias—conditions under which there would be a tendency to the Maximum Theoretical Mean Deviation Possible and the Maximum Theoretical Standard Deviation Possible.

11.5.4.5. If, in a given model, the object of study is based on the hypothesis that a single subject or option is the most ideal (for whatever reason), then the rational critique of the tendency should be carried out via Positive Bias Validity and Critical Sample Level of Bias.

11.5.4.6. But if, in a given empirical model, there exists an omega subset of ideal subjects or options within N, then the rational critique should be carried out via Omega Validity and Omega Sample Level, as well as through Critical Ideal Similarity—Individual or Sample—and other tests to be explained later.

11.5.4.7. Since omega-defined models—those in which, for N equals to or greater than two, there is a subset of ideal subjects or options greater than one and less than N (a subset of ideals between two and N minus one)—are not the statistical norm but rather exceptional, the study of these models will be addressed in a complementary manner to the other existing models, while making it clear that if, in a real situation, conditions of tendency toward maximum empirical dispersion occur, the corresponding statistical tests should be applied. Likewise, if omega conditions occur in a model, the corresponding models for this kind of contrast should be applied.

11.5.4.8. Models that include in N a subset of ideal subjects or options—greater than one and less than N—called the omega subset, may occur in any kind of universe, except logically in universes limited to two options. If in a universe limited to two options both options are equally ideal, then it would be a model of equality of opportunities.

11.5.4.9. This type of model—formed by more than one ideal subject or option—will receive relatively limited attention in this work, alternating its study with the more "normal" models, those whose dispersion oscillates between zero and maximum: zero

if they tend to equality of opportunities; maximum if they tend to models where conditions of maximum possible dispersion may occur—i.e., where among N there is only one subject or option that, for whatever reason, stands out above the others to become the only ideal subject or option of N—as well as, logically, noting the possibility of zero samples. To continue the study of the normal models—those whose dispersion oscillates between zero and maximum—we proceed with the exposition of critical proportions for these approaches.

11.6. Critical proportions. Proportionality of the tendency

11.6.1. The concept of Critical Proportion

11.6.1.1. Given a one-hundred percent, any part out of one hundred percent is the proportionality of that part to the whole. Given such a proportionality, it can be critiqued directly against a percentage X of error or reliability divided by one hundred—the **First Table**. The main advantage of critical proportions is that the calculation of the critical probability is simplified to dividing by one hundred the percentage X of error or reliability accepted by scientific policy, **except** for the **Individual Critical Proportion of Empirical Negative Bias**.

11.6.1.2. If the 100% maximum for the Bias Level is, in equality of opportunities or positive bias, the **Maximum Theoretical Bias Possible**, then, in equality of opportunities, the proportion of the absolute value of the Bias Level to the Maximum Theoretical Bias Possible will be the theoretical proportion of that absolute Bias Level to the Maximum Theoretical Bias Possible; if it is equal to or less than a critical ratio, it is accepted. The critical ratio will simply be percentage X of error divided by one hundred, so that only **zero or positive** is accepted in the difference **critical probability minus** the quotient of absolute Bias Level over Maximum Theoretical Bias Possible.

11.6.1.3. In the study of positive bias, the quotient of Bias Level over Maximum Theoretical Bias Possible will be the theoretical proportion of the Bias Level to the Maximum Theoretical Bias Possible; if this quotient is equal to or greater than a critical ratio, it is accepted. The critical ratio will simply be percentage X of reliability divided by one hundred, so that **quotient (Bias Level / Maximum Theoretical Bias Possible) minus critical probability = zero or positive** is accepted in the study of positive bias.

11.6.1.4. If the 100% maximum of negative bias is the **inversion of N**, then if the difference—**inversion of N** minus empirical probability—is divided by the inversion of N, that quotient is the theoretical proportion of negative bias (by inverting the factors of the bias differential in the first factor of the quotient to be divided by the Maximum Possible Negative Bias). If this theoretical proportion is equal to or greater than a critical ratio, it is accepted; the critical ratio is simply percentage X of reliability divided by one hundred. Thus, the quotient—(inversion of N minus empirical probability) over inversion of N—then **quotient minus critical probability** accepts only zero or positive in the study of negative bias.

11.6.1.5. Since for studying equality the quotient of absolute Bias Level over Maximum Theoretical Bias Possible is a quotient that should tend to zero, the **Proportionality of Equality** will be equal to **one minus** that quotient. The closer the Proportionality of Equality tends to one, the greater the tendency to equality; therefore, the Proportionality of Equality must be equal to or greater than percentage X of reliability divided by one hundred.

11.6.1.6. Just as one can study the behavior of equality of opportunities or bias via the quotient of empirical differentials over the Maximum Theoretical Bias Possible—obtaining theoretical proportions—one way to study **empirical** proportions (individual empirical proportions) would be via the quotient of empirical differentials over the **Maximum Empirical Bias Possible**, contrasting the results against a critical ratio.

11.6.1.7. The following statistical tests—as can be inferred—being tests that use the models of Maximum Theoretical Bias Possible, Maximum Theoretical Mean Deviation, Variance, or Standard Deviation, can be applied to positive-bias studies **only under the hypothesis that there is a single ideal subject or option in the whole N**. These designs cannot be applied to samples N that include an omega subset. For realities that include an omega subset within N, one should apply **Omega Validity**, **Omega Sample Level**, and **Critical Ideal Similarity (Individual or Sample)**.

11.6.2. Individual Critical Proportions

11.6.2.1. Critical Individual Proportion of Theoretical Equality

11.6.2.1.1. The Individual Proportion of Theoretical Equality will be equal to one minus the quotient of the absolute value of the Bias Level over the difference of one minus inversion of *N*:

Individual Proportion of Theoretical Equality =

$$1–[\,/(p(xi)–1/N)/\ :\ (1–1/N)]$$

11.6.2.1.2. Critical Individual Proportion of Theoretical Equality: one minus the quotient of the absolute value of the Bias Level over the difference of one minus inversion of *N*, and from the result subtract a critical probability equal to percentage *X* of reliability divided by one hundred (1st TABLE). Only zero or positive is accepted in equality of opportunities:

Critical Individual Proportion of Theoretical Equality =

$$\{1–[\,/(p(xi)–1/N)/\ :\ (1–1/N)]\}–p(xc) = \text{zero or positive} \rightarrow \text{equality of opportunities is accepted}$$
$$p(xc) = X : 100$$
$$X = \text{reliability percentage}$$

11.6.2.1.3. Individual Percentage of Theoretical Equality: one hundred times the Individual Proportion of Theoretical Equality.
Individual Percentage of Theoretical Equality =

$$\{1-[\,/(p(xi)-1/N)/\ :\ (1-1/N)]\}\cdot 100$$

11.6.2.1.4. Critical Individual Percentage of Theoretical Equality: Individual Percentage of Theoretical Equality minus a percentage *X* of reliability. Only zero or positive is accepted.
Critical Individual Percentage of Theoretical Equality =

$$\{\{1-[\,/(p(xi)-1/N)/\ :\ (1-1/N)]\}\cdot 100\}-X = \text{zero or positive} \rightarrow \text{equality of opportunities is accepted}$$
$$X = \text{reliability percentage}$$

11.6.2.2. Critical Individual Proportion of Theoretical Positive Bias

11.6.2.2.1. Individual Proportion of Theoretical Positive Bias: quotient of Bias Level over the difference of one minus inversion of *N*:
Individual Proportion of Theoretical Positive Bias =

$$(p(xi)-1/N) : (1-1/N)$$

11.6.2.2.2. Critical Individual Proportion of Theoretical Positive Bias: quotient of Bias Level over the difference of one minus inversion of *N*, and the result minus a critical probability; only zero or positive is accepted. The critical probability equals percentage *X* of reliability divided by one hundred (1st TABLE): Critical Individual Proportion of Theoretical Positive Bias =

$$[(p(xi)–1/N) : (1–1/N)]–p(xc) = \text{zero or positive} \rightarrow \text{positive bias is accepted}$$
$$p(xc) = X : 100$$
$$X = \text{reliability percentage}$$

11.6.2.2.3. Individual Percentage of Theoretical Positive Bias: one hundred times the quotient of Bias Level over the difference of one minus inversion of *N*: Individual Percentage of Theoretical Positive Bias =

$$[(p(xi)–1/N) : (1–1/N)]\cdot 100$$

11.6.2.2.4. Critical Individual Percentage of Theoretical Positive Bias: one hundred times the quotient of Bias Level over the difference of one minus inversion of *N*, and the result minus a percentage *X* of reliability; only zero or positive is accepted: Critical Individual Percentage of Theoretical Positive Bias =

$$\{[(p(xi)–1/N) : (1–1/N)]\cdot 100\}–X = \text{zero or positive} \rightarrow \text{positive bias is accepted}$$
$$X = \text{reliability percentage}$$

11.6.2.3. Critical Individual Proportion of Theoretical Negative Bias

11.6.2.3.1. Individual Proportion of Theoretical Negative Bias: difference of inversion of *N* minus empirical probability, and the result divided by inversion of *N*: Individual Proportion of Theoretical Negative Bias =

$$(1/N–p(xi)) : 1/N$$

11.6.2.3.2. Critical Individual Proportion of Theoretical Negative Bias: difference of inversion of *N* minus empirical probability, and the result divided by inversion of *N*; the quotient minus critical probability must be zero or positive. The critical probability equals percentage *X* of reliability divided by one hundred (1st TABLE): Critical Individual Proportion of Theoretical Negative Bias =

$$[(1/N–p(xi)) : 1/N]–p(xc) = \text{zero or positive} \rightarrow \text{negative bias is accepted}$$
$$p(xc) = X : 100$$
$$X = \text{reliability percentage}$$

11.6.2.3.3. Individual Percentage of Theoretical Negative Bias: difference of inversion of *N* minus empirical probability, that difference over inversion of *N*, and the quotient times one hundred: Individual Percentage of Theoretical Negative Bias =

$$[(1/N–p(xi)) : 1/N]\cdot 100$$

11.6.2.3.4. Critical Individual Percentage of Theoretical Negative Bias: Individual Percentage of Theoretical Negative Bias minus a percentage *X* of reliability; zero or positive is accepted: Critical Individual Percentage of Theoretical Negative Bias =

Critical Individual Percentage of Theoretical Negative Bias =
$\{[(1/N - p(xi)) : 1/N] \cdot 100\} - X =$ zero or positive → negative bias is accepted
$X =$ reliability percentage

11.6.2.4. Critical Individual Proportion of Empirical Equality

11.6.2.4.1. Individual Proportion of Empirical Equality: one minus the quotient of the absolute value of the Bias Level over the Maximum Empirical Bias Possible, where the Maximum Empirical Bias Possible equals the Total Bias divided by two, and the Total Bias equals the sum of the absolute value of all normal Bias Levels: Individual Proportion of Empirical Equality =

$$1 - \{ /(p(xi) - 1/N)/ : [\sum /(p(xi) - 1/N)/ : 2] \}$$

11.6.2.4.2. Critical Individual Proportion of Empirical Equality: Individual Proportion of Empirical Equality minus a critical probability; only zero or positive is accepted. The critical probability is percentage *X* of reliability divided by one hundred (1st TABLE): Critical Individual Proportion of Empirical Equality =

$\{1-\{/(p(xi)-1/N)/:[\sum/(p(xi)-1/N)/:2]\}\}-p(xc) =$ zero or positive → equality of opportunities is accepted
$p(xc) = X:100$
$X =$ reliability percentage

11.6.2.4.3. Individual Percentage of Empirical Equality: one hundred times the Individual Proportion of Empirical Equality: Individual Percentage of Empirical Equality =

$$\{1-\{/(p(xi)-1/N)/:[\sum/(p(xi)-1/N)/:2]\}\}\cdot 100$$

11.6.2.4.4. Critical Individual Percentage of Empirical Equality: Individual Percentage of Empirical Equality minus a percentage *X* of reliability; zero or positive is accepted: Critical Individual Percentage of Empirical Equality =

$\{\{1-\{/(p(xi)-1/N)/:[\sum/(p(xi)-1/N)/:2]\}\}\cdot 100\}-X =$ zero or positive → equality of opportunities is accepted
$X =$ reliability percentage

11.6.2.5. Critical Individual Proportion of Empirical Positive Bias

11.6.2.5.1. Individual Proportion of Empirical Positive Bias: Bias Level over Maximum Empirical Bias Possible:
Individual Proportion of Empirical Positive Bias =

$$(p(xi)–1/N) : [\sum /(p(xi)–1/N)/ : 2]$$

11.6.2.5.2. Critical Individual Proportion of Empirical Positive Bias, the difference between the Individual Proportion of Empirical Positive Bias and a critical probability; only zero or positive is accepted. The critical probability equals percentage *X* of reliability divided by one hundred.
Critical Individual Proportion of Empirical Positive Bias =

{ (p(xi) – 1/N) : [∑ / (p(xi) – 1/N) / : 2] } – p(xc) = zero or positive → positive bias is accepted

p(xc) = X : 100

X = reliability percentage

11.6.2.5.3. Individual Percentage of Empirical Positive Bias. One hundred times the Individual Proportion of Empirical Positive Bias.
Individual Percentage of Empirical Positive Bias =

{ (p(xi) – 1/N) : [∑ / (p(xi) – 1/N) / : 2] } · 100

11.6.2.5.4. Critical Individual Percentage of Empirical Positive Bias. Individual Percentage of Empirical Positive Bias minus percentage *X* of reliability; zero or positive is accepted.

Critical Individual Percentage of Empirical Positive Bias =

{ { (p(xi) – 1/N) : [∑ / (p(xi) – 1/N) / : 2] } · 100 } – X = zero or positive → positive bias is accepted

X = reliability percentage

11.6.2.6. Critical Individual Proportion of Empirical Negative Bias

11.6.2.6.1. This will be one of the exceptions among the critical proportions, since the critical probability must be calculated as the product of percentage *X* of reliability, divided by one hundred, by the quotient of inversion of *N* over Maximum Empirical Bias Possible.

11.6.2.6.2. Individual Proportion of Empirical Negative Bias, difference of inversion of *N* minus empirical probability, and the result divided by Maximum Empirical Bias Possible.

Individual Proportion of Empirical Negative Bias =

(1/N – p(xi)) : [∑ / (p(xi) – 1/N) / : 2]

between the Individual Proportion of Empirical Negative Bias and a critical probability; zero or positive is accepted. The critical probability equals the product of percentage *X* of reliability, divided by one hundred, by the quotient of inversion of *N* over Maximum Empirical Bias Possible.

Critical Individual Proportion of Empirical Negative Bias =

{ (1/N – p(xi)) : [∑ / (p(xi) – 1/N) / : 2] } – p(xc) = zero or positive → negative bias is accepted

p(xc) = { 1/N : [∑ / (p(xi) – 1/N) / : 2] } · (X : 100)

X = reliability percentage

11.6.2.6.4. Individual Percentage of Empirical Negative Bias. One hundred times the Individual Proportion of Empirical Negative Bias.

Individual Percentage of Empirical Negative Bias =

{ (1/N – p(xi)) : [∑ / (p(xi) – 1/N) / : 2] } · 100

11.6.2.6.5. Critical Individual Percentage of Empirical Negative Bias. Individual Percentage of Empirical Negative Bias minus a critical value “XC”. Zero or positive is accepted. The critical value **XC** equals the product of the critical probability by one hundred. The critical probability equals the product of percentage *X* of reliability, divided by one hundred, by the quotient of inversion of *N* over Maximum Empirical Bias Possible.

Critical Individual Percentage of Empirical Negative Bias =

{ { (1/N – p(xi)) : [∑ / (p(xi) – 1/N) / : 2] } · 100 } – XC = zero or positive → negative bias is accepted

XC = { { 1/N : [∑ / (p(xi) – 1/N) / : 2] } · (X : 100) } · 100

X = reliability percentage

11.6.3. Sample Critical Proportions

11.6.3.1. Critical proportions and critical percentages at the sample level

11.6.3.1.1. If the individual theoretical or empirical proportions were the quotient of individual dispersion over the Maximum Theoretical Bias Possible or Maximum Empirical Bias Possible, at the sample level it will be exactly the same, except it will be the quotient of Mean Deviation or Variance or Standard Deviation over the Maximum Theoretical Mean Deviation, or Variance, or Standard Deviation; or, at the empirical level, the proportion given by the quotient of Intermediate Deviation over Maximum Intermediate Deviation.

11.6.3.1.2. In theoretical sample proportions, the critical probability will always be calculated in the same way (the 1st TABLE still applies), the critical probability being a

reliability margin equal to percentage *X* of reliability divided by one hundred, for both theoretical and empirical sample proportions.

11.6.3.1.3. In the Sample Critical Proportion of Theoretical Equality, in order to value proportions such that the closer to one, the greater the equality, we take one minus the quotient of sample empirical dispersion over the maximum theoretical sample dispersion; this difference can then be contrasted directly against a critical probability as a reliability margin (percentage *X* of reliability divided by one hundred, 1st TABLE).

11.6.3.2. Theoretical Sample Critical Proportions using Mean Deviation

11.6.3.2.1. Sample Critical Proportion of Theoretical Equality in Mean Deviation

11.6.3.2.1.1. Sample Proportion of Theoretical Equality in Mean Deviation (MD): one minus the quotient of Mean Deviation over the Maximum Theoretical Mean Deviation Possible.

Sample Proportion of Theoretical Equality in Mean Deviation =

$$1 - \{ MD : \{ [(1 - 1/N) \cdot 2] : N \} \}$$

MD= Mean Deviation

11.6.3.2.1.2. Sample Critical Proportion of Theoretical Equality in Mean Deviation: one minus the quotient of Mean Deviation (MD) over the Maximum Theoretical Mean Deviation Possible, and the result minus a critical probability. Zero or positive is accepted. Critical probability equals percentage *X* of reliability divided by one hundred (1st TABLE).

Sample Critical Proportion of Theoretical Equality in Mean Deviation =

{ 1 – { MD : { [(1 – 1/N) · 2] : N } } } – p(xc) = zero or positive → equality of opportunities is accepted

MD = Mean Deviation

p(xc) = X : 100

X = reliability percentage

11.6.3.2.1.3. Sample Percentage of Theoretical Equality in Mean Deviation: one hundred times the difference of one minus the quotient of Mean Deviation over the Maximum Theoretical Mean Deviation Possible.

Sample Percentage of Theoretical Equality in Mean Deviation =

{ 1 – { MD : { [(1 – 1/N) · 2] : N } } } · 100

11.6.3.2.1.4. Critical Sample Percentage of Theoretical Equality in Mean Deviation: one hundred times the difference of one minus the quotient of Mean Deviation (MD) over the Maximum Theoretical Mean Deviation Possible, and the result minus percentage *X* of reliability.

Critical Sample Percentage of Theoretical Equality in Mean Deviation =

$\{\{1 - \{MD : \{[(1 - 1/N) \cdot 2] : N\}\}\} \cdot 100\} - X$ = zero or positive → equality of opportunities is accepted

MD= Mean Deviation

X = reliability percentage

11.6.3.2.2. Sample Critical Proportion of Theoretical Bias in Mean Deviation

11.6.3.2.2.1. Sample Proportion of Theoretical Bias in Mean Deviation: quotient of Mean Deviation (MD) over the Maximum Theoretical Mean Deviation Possible. Sample Proportion of Theoretical Bias in Mean Deviation =

$MD : \{[(1 - 1/N) \cdot 2] : N\}$

MD= Mean Deviation

11.6.3.2.2.2. Sample Critical Proportion of Theoretical Bias in Mean Deviation: quotient of Mean Deviation over the Maximum Theoretical Mean Deviation Possible, and the result minus a critical probability; zero or positive is accepted. The critical probability equals percentage *X* of reliability divided by one hundred (1st TABLE). Sample Critical Proportion of Theoretical Bias in Mean Deviation =

[DM : { [(1 – 1/N) · 2] : N }] – p(xc) = zero or positive is accepted in the study of bias

MD= Mean Deviation

p(xc) = X : 100

X = reliability percentage

11.6.3.2.2.3. Sample Percentage of Theoretical Bias in Mean Deviation. Multiply by one hundred the quotient of Mean Deviation (MD) between Maximum Possible Theoretical Mean Deviation

Sample Percentage of Theoretical Bias in Mean Deviation =

{ [MD : { [(1 – 1/N) · 2] : N }] · 100 }

MD=Mean Deviation

11.6.3.2.2.4. Critical Sample Percentage of Theoretical Bias in Mean Deviation. The product of one hundred by the quotient of Mean Deviation (MD) between Maximum Possible Theoretical Mean Deviation, and the result minus a reliability percentage X. Zero or positive is accepted

Critical Sample Percentage of Theoretical Bias in Mean Deviation =

$\{ [MD : \{ [(1 - 1/N) \cdot 2] : N \}] \cdot 100 \} - X$ = zero or positive is accepted in bias study

MD = Mean Deviation

X = reliability percentage

11.6.3.3. Theoretical Critical Sample Proportions using Variance

11.6.3.3.1. Critical Sample Proportion of Theoretical Equality in Variance

11.6.3.3.1.1. Sample Proportion of Theoretical Equality in Variance, difference of the unit minus the quotient of Variance (V) between Maximum Possible Theoretical Variance

Sample Proportion of Theoretical Equality of Variance =

$1 - \{ s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \}$

s^2 = Variance

11.6.3.3.1.2. Critical Sample Proportion of Theoretical Equality in Variance, difference of the unit minus the quotient of Variance (s^2) between Maximum Possible Theoretical Variance, and the result minus a critical probability, zero or positive is accepted. The critical probability equals percentage X of reliability over one hundred, 1st TABLE

Critical Sample Proportion of Theoretical Equality of Variance =

$\{ 1 - \{ s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \} - p(xc) =$ zero or positive is accepted equality

s^2 = Variance

$p(xc) = X : 100$

X = reliability percentage

11.6.3.3.1.3. Sample Percentage of Theoretical Equality in Variance, product of one hundred by the difference of the unit minus the quotient of Variance (s^2) between Maximum Possible Theoretical Variance

Sample Percentage of Theoretical Equality of Variance =

$$\{ 1 - \{ s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \} \cdot 100$$

Variance $= s^2$

11.6.3.3.1.4. Critical Sample Percentage of Theoretical Equality in Variance, product of one hundred by the difference of the unit minus the quotient of Variance between Maximum Possible Theoretical Variance, result of product minus a reliability percentage X

Critical Sample Percentage of Theoretical Equality of Variance =

$$\{ \{ 1 - \{ s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \} \cdot 100 \} - X$$ = zero or positive is accepted equality

Variance = s^2

X = reliability percentage

11.6.3.3.2. Critical Sample Proportion of Theoretical Bias in Variance

11.6.3.3.2.1. Sample Proportion of Theoretical Bias in Variance. Variance (s^2) between Maximum Possible Theoretical Variance

Proportion of Variance =

$$s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \}$$

Variance= s^2

11.6.3.3.2.2. Critical Sample Proportion of Theoretical Bias in Variance. Variance (s^2) between Maximum Possible Theoretical Variance, and the result minus a critical probability, zero or positive is accepted. The critical probability equals percentage X of reliability over one hundred, 1st TABLE

Critical Sample Proportion of Theoretical Bias in Variance =

$$\{ s^2 : \{ \{ (1 - 1/N)^2 + (1/N^2 \cdot (N - 1)) \} : N \} \} - p(xc) = \text{zero or positive is accepted bias}$$

s^2=Variance

$p(xc) = (X : 100)$

X = reliability percentage

11.6.3.3.2.3. Sample Percentage of Theoretical Bias of Variance. Product of one hundred by the quotient of Variance (s^2) between Maximum Possible Theoretical Variance

Sample Percentage of Theoretical Bias of Variance =

$$\{ s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \cdot 100$$

s^2 = Variance

11.6.3.3.2.4. Critical Sample Percentage of Theoretical Bias of Variance. One hundred times the quotient of Variance (s^2) between Maximum Possible Theoretical Variance, and the result minus a reliability percentage X, zero or positive is accepted

Critical Sample Percentage of Theoretical Bias of Variance =

$$\{ \{ s^2 : \{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \cdot 100 \} - X = \text{zero or positive is accepted bias}$$

s^2 = Variance

X = reliability percentage

11.6.3.4. Theoretical Critical Sample Proportions using Standard Deviation

11.6.3.4.1. Critical Sample Proportion of Theoretical Equality in Standard Deviation

11.6.3.4.1.1. Sample Proportion of Theoretical Equality in Standard Deviation, unit minus quotient of Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation

Sample Proportion of Theoretical Equality in Standard Deviation =

$$1 - \{ S : \sqrt{\{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \}}$$

S= Standard Deviation

11.6.3.4.1.2. Critical Sample Proportion of Theoretical Equality in Standard Deviation, unit minus result of Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation, and the result of the difference minus critical probability, zero or positive is accepted. The critical probability equals percentage X of reliability over one hundred, 1st TABLE

Critical Sample Proportion of Theoretical Equality in Standard Deviation =

$\{ 1 - \{ S : \sqrt{\{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \}} \} - p(xc)$ = zero or positive is accepted equality

S= Standard Deviation

p(xc) = X : 100

X = reliability percentage

11.6.3.4.1.3. Sample Percentage of Theoretical Equality in Standard Deviation, unit minus quotient of Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation, and the result by one hundred

Sample Percentage of Theoretical Equality in Standard Deviation =

$$\{ 1 - \{ S : \sqrt{\{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \} \cdot 100$$

S= Standard Deviation

11.6.3.4.1.4. Critical Sample Percentage of Theoretical Equality in Standard Deviation, unit minus quotient of dividing Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation, the result of the difference by one hundred, the result of the product minus a reliability percentage X

Critical Sample Percentage of Theoretical Equality in Standard Deviation =

$$\{ \{ 1 - \{ S : \sqrt{\{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \} \cdot 100 \} - X$$ = zero or positive is accepted equality

S= Standard Deviation

X = reliability percentage

11.6.3.4.2. Critical Sample Proportion of Theoretical Bias in Standard Deviation

11.6.3.4.2.1. Sample Proportion of Theoretical Bias in Standard Deviation, Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation

Sample Proportion of Theoretical Bias in Standard Deviation =

$$S : \sqrt{\{ \{ (1 – 1/N)^2 + ((1/N)^2 \cdot (N – 1)) \} : N \}}$$

S= Standard Deviation

11.6.3.4.2.2. Critical Sample Proportion of Theoretical Bias in Standard Deviation. Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation, and the result minus critical probability, zero or positive is accepted. The critical probability equals percentage X of reliability over one hundred, 1st TABLE

Critical Sample Proportion of Theoretical Bias in Standard Deviation =

$$\{ S : \sqrt{\{ \{ (1 – 1/N)^2 + ((1/N)^2 \cdot (N – 1)) \} : N \}} \} – p(xc) = \text{zero or positive is accepted bias}$$

S= Standard Deviation

$p(xc) = X : 100$

X = reliability percentage

11.6.3.4.2.3. Sample Percentage of Theoretical Bias in Standard Deviation. Product of one hundred by the quotient of Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation

Sample Percentage of Theoretical Bias in Standard Deviation =

$$\{ S : \sqrt{\{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \cdot 100$$

S= Standard Deviation

11.6.3.4.2.4. Critical Sample Percentage of Theoretical Bias in Standard Deviation. Standard Deviation (S) between Maximum Possible Theoretical Standard Deviation, and the result by one hundred, the result of the product minus a reliability percentage X, zero or positive is accepted

Critical Sample Percentage of Theoretical Bias in Standard Deviation =

$$\{ \{ S : \sqrt{\{ \{ (1 - 1/N)^2 + ((1/N)^2 \cdot (N - 1)) \} : N \} \} \cdot 100 \} - X$$ = zero or positive is accepted bias

S= Standard Deviation

X = reliability percentage

11.6.3.5. Empirical Critical Sample Proportions

11.6.3.5.1. The difference between Theoretical Critical Sample Proportions and the Empirical ones is that while the Theoretical are theoretical for being proportions based on the maximum possible theoretical tendency, in contrast, the empirical proportions will be empirical for using statistics of maximum empirical tendency.

11.6.3.5.2. Empirically, the empirical tendency of the sample, the Mean or Standard Deviation, can never be greater than the Intermediate Deviation, the Intermediate Deviation being the result of dividing by two the difference between the maximum minus the minimum. Only in two-option models is the Mean or Standard Deviation equal to the Intermediate Deviation.

11.6.3.5.3. The analytical method of Impossible Probability is the syllogism of tendency, thus depending on the observed tendencies a hypothesis is accepted or rejected. To accept or reject a certain behavior, rational critique contrasts tendencies within a model and with reference to the maximum possible tendency for that model. The rational critique models in Impossible Probability are established from analytical propositions deduced from the application of syllogism to the analysis of tendency, for example, an analytical proposition about tendency, that the maximum dispersion is only possible if of all N only a single subject or option tends to be different from zero due to its ideal nature, then all the others, N minus one, tend to zero, then that single subject or ideal option tends to Maximum Possible Empirical Probability.

11.6.3.5.3.1. If of all N only one tends to be different from zero, tending to empirical probability equal to unity, there will be N minus one subjects or options that will have the Minimum Possible Empirical Probability, probability zero.

11.6.3.5.4. Then under conditions of maximum possible dispersion, that only one subject or option is different from zero, and all the others are zero, the Maximum Intermediate Dispersion would be equal to dividing by two the difference of unity minus zero, which is equal to zero point five.

Maximum Intermediate Dispersion = (1 – 0) : 2 = 0.5

11.6.3.5.5. If we know what the Maximum Intermediate Dispersion is, and we want to contrast the Intermediate Dispersion of a given sample in relation to the Maximum Intermediate Dispersion, then, we must make the quotient of Intermediate Dispersion between Maximum Intermediate Dispersion. In bias study the result must be equal or superior to critical probability, in equality of opportunities equal or inferior to a critical probability. In equality of opportunities there remains the option of subtracting from unity the quotient of Intermediate Deviation between Maximum Intermediate Deviation, which must be equal or superior to critical probability, in the study of equality of opportunities.

11.6.3.5.6. Critical Sample Proportion of Empirical Equality

11.6.3.5.6.1. Sample Proportion of Empirical Equality, unit minus quotient of Intermediate Deviation between Maximum Intermediate Deviation

Sample Proportion of Empirical Equality =

1 – { [(p(xi+) – p(xi–)) : 2] : 0.5 }

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

11.6.3.5.6.2. Critical Sample Proportion of Empirical Equality, Sample Proportion of Empirical Equality minus critical probability, zero or positive is accepted. Critical probability equals percentage X of reliability over one hundred

Critical Sample Proportion of Empirical Equality =

{ 1 – { [(p(xi+) – p(xi–)) : 2] : 0.5 } } – p(xc) = zero or positive is accepted equality

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

p(xc) = X : 100

X = reliability percentage

11.6.3.5.6.3. Sample Percentage of Empirical Equality, Sample Proportion of Empirical Equality by one hundred

Sample Percentage of Empirical Equality =
{ 1 – { [(p(xi+) – p(xi–)) : 2] : 0.5 } } · 100

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

11.6.3.5.6.4. Critical Sample Percentage of Empirical Equality, Sample Percentage of Empirical Equality minus reliability percentage X

Critical Sample Percentage of Empirical Equality =

{ { 1 – { [(p(xi+) – p(xi–)) : 2] : 0.5 } } · 100 } – X = zero or positive is accepted equality

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

X = reliability percentage

11.6.3.5.7. Critical Sample Proportion of Empirical Bias

11.6.3.5.7.1. Sample Proportion of Empirical Bias, quotient of Intermediate Deviation between Maximum Intermediate Deviation

Sample Proportion of Empirical Bias =

[(p(xi+) – p(xi–)) : 2] : 0.5

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

11.6.3.5.7.2. Critical Sample Proportion of Empirical Bias, Sample Proportion of Empirical Bias minus critical probability, zero or positive is accepted bias. Critical probability equals percentage X of reliability over one hundred

Critical Sample Proportion of Empirical Bias =

{ [(p(xi+) – p(xi–)) : 2] : 0.5 } – p(xc) = zero or positive is accepted bias

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

p(xc) = X : 100

X = reliability percentage

11.6.3.5.7.3. Sample Percentage of Empirical Bias, Sample Proportion of Empirical Bias by one hundred

Sample Percentage of Empirical Bias =

{ [(p(xi+) – p(xi–)) : 2] : 0.5 } · 100

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

11.6.3.5.7.4. Critical Sample Percentage of Empirical Bias, Sample Percentage of Empirical Bias minus reliability percentage X, zero or positive is accepted bias

Critical Sample Percentage of Empirical Bias =

{ { [(p(xi+) – p(xi–)) : 2] : 0.5 } · 100 } – X = zero or positive is accepted bias

p(xi+)= maximum empirical probability

p(xi-)= minimum empirical probability

X = reliability percentage

11.6.4. Probability of Equality and Probability of Bias, Positive or Negative

11.6.4.1. The quotient of one part between one hundred percent is the proportional part of that part over one hundred percent.

11.6.4.2. When that part is a part in the sum of that one hundred percent, then, it is no longer a simple proportion, it is in every sense a probability. A probability is not simply a part over one hundred percent, probability empirically is that part of the one hundred percent in which the part has been added to other parts to give rise to that one hundred percent.

11.6.4.3. If empirically probability is the proportion of one part to the sum of all parts, if Total Bias is the sum of all parts, bias, in a sample of biases, necessarily the Probability of Bias must be equal to the quotient of the individual bias over the Total Bias.

11.6.4.4. In equality of opportunities, as the absolute value of the Bias Level tends to be zero, then a tendency to zero over the Total Bias will be a probability that tends to

zero; insofar as dispersion tends to zero, then the Probability of Equality will be equal to the difference of zero point five minus the quotient of the absolute value of the Bias Level over Total Bias, the critical probability being calculated on the product of zero point five by the reliability percentage X over one hundred. The reason why the quotient is subtracted from zero point five, and the critical probability is zero point five times a reliability percentage X over one hundred, is because if the Maximum Possible Empirical Bias is the Total Bias over two, the maximum possible proportion would be Maximum Possible Empirical Bias over Total Bias, which is zero point five; therefore, contrasts must be made on the maximum tendency of the quotient.

11.6.4.5. The Probability of Positive Bias will be equal to the quotient of the Bias Level over Total Bias, and in the critical contrast it must be equal to or greater than a critical probability; the critical probability will be equal to the product of the reliability percentage X, over one hundred, by the quotient of Maximum Possible Empirical Bias over Total Bias, that is, reliability percentage X, over one hundred, times zero point five.

11.6.4.6. The Probability of Negative Bias, inversion of N minus empirical probability, and result over Total Bias, in the critical contrast must be equal to or greater than critical probability; the critical probability for this contrast will be the product of the reliability percentage X, over one hundred, by the quotient of inversion of N over the Total Bias.

11.6.5. Critique of Probability of Equality

14.6.5.1. Probability of Equality, difference of zero point five minus quotient of absolute value of Bias Level over Total Bias

$$\text{Probability of Equality} = 0.5 - \{ / (p(xi) - 1/N) / : [\sum / (p(xi) - 1/N) /] \}$$

11.6.5.2. Critique of Probability of Equality, difference of zero point five minus quotient of absolute value of Bias Level over Total Bias, and from the result a critical probability is subtracted, zero or positive is accepted. Critical probability equal to the product of zero point five by the reliability percentage X over one hundred Critique of Probability of Equality =

{ 0.5 – { / (p(xi) – 1/N) / : [∑ / (p(xi) – 1/N) /] } } – p(xc) = zero or positive equality is accepted

p(xc) = 0.5 · (X : 100)

X = reliability percentage

11.6.6. Critique of Probability of Positive Bias

11.6.6.1. Probability of Positive Bias, Bias Level over Total Bias

Probability of Positive Bias = (p(xi) – 1/N) : [∑ / (p(xi) – 1/N) /]

11.6.6.2. Critique of Probability of Positive Bias. Bias Level over Total Bias and the result minus critical probability, zero or positive is accepted. The critical probability equal to zero point five times the reliability percentage X, over one hundred

Critique of Probability of Positive Bias =

{ (p(xi) – 1/N) : [∑ / (p(xi) – 1/N) /] } – p(xc) = zero or positive positive bias is accepted

p(xc) = 0.5 · (X : 100)

X = reliability percentage

11.6.7. Critique of Probability of Negative Bias

11.6.7.1. Probability of Negative Bias, difference of inversion of N minus empirical probability, and the result divided by Total Bias

Probability of Negative Bias = (1/N – p(xi)) : [∑ / (p(xi) – 1/N) /]

11.6.7.2. Critique of Probability of Negative Bias, difference of inversion of N minus empirical probability, and the result divided by Total Bias, from the quotient result a critical probability is subtracted, zero or positive is accepted. The critical probability will be equal to the product of the reliability percentage X, over one hundred, by the quotient of inversion of N over Total Bias

Rational Critique of Probability of Negative Bias =

{ (1/N – p(xi)) : [∑ / (p(xi) – 1/N) /] } – p(xc) = zero or positive negative bias is accepted

p(xc) = { 1/N : [∑ / (p(xi) – 1/N) /] } · (X : 100)

X = reliability percentage

11.7. Interpretation of the rational critique

11.7.1. The rational critique models set out in this section are possible models of an intrameditional nature. From section sixteen onwards, other models of rational critique of an intermeditional nature will be explained.

11.7.2. And even within intrameditional critique, those presented here are intrameditional rational critique models that could be adapted to the rational critique of raw scores or frequencies, as explained in the following section. There also exist models of rational critique of a relative nature, when critiquing Bias Levels relative to the different individual statistics: maximum “p(xi+)”, minimum “p(xi-)”, intermediate “p(xi+/-)”, closest to inversion of N “p(xi≈)”, or any other determined empirical probability “p(xn)”. And, in addition, the rational critique models for the Standard Score adapted to the Second Method.

11.7.3. Any model of rational critique is one among the possible; the scientific policy of using a model must justify it in the approach, objectives, ideals, and the object of study.

11.7.4. Within the models explained in this section, it should be said that, for example, the rational critique of the Bias Level can be done in two ways: in equality of opportunities, study of error in Validity of Equality, or reliability in Significance of Equality. In bias study, reliability in Validity of Bias, Positive or Negative, or study of error, Significance of Bias, Positive or Negative. Likewise for the sample. The sample tendency to equality can be studied in study of error, Critical Sample Level of Equality, or reliability, Significance of Equality in Mean or Standard Deviation. The sample tendency to bias can be studied via reliability, Critical Sample Level of Bias, or study of error, Significance of Bias in Mean or Standard Deviation.

11.7.5. Every individual study, whether Validity or Significance, of the Bias Level, must always be complemented by the study of the sample tendency, whether through Sample Level or Significance of Mean or Standard Deviation (*DMoS*), in order to avoid a procedural error of making a universal inference on a factual error.

11.7.6. Insofar as for the rational critique of Validity or Significance—individually—or the Sample Level or Significance of Mean or Standard Deviation , it is a rational critique made on proportions of error or reliability we are willing to accept about reality, another alternative is to critique directly the proportion between the empirical model and the model of maximum tendency or ideal, that is, the Critical Proportion, which may be Empirical or Theoretical, Individual or Sample. In any case, every model of Individual Critical Proportion must be accompanied by a model of Sample Critical Proportion in order to avoid a factual error in the inference.

11.7.7. The Individual Critical Proportion and Sample Critical Proportion can be empirical or theoretical rational critique; for example, in equality of opportunities or positive bias, at the individual level the quotient of absolute value of Bias Level or Bias Level over Maximum Bias—Empirical or Theoretical—Possible; or in negative bias the quotient of the difference, of inversion of N minus empirical probability, over inversion of N or Maximum Possible Empirical Bias. In the equality proportions, so that the proportion is a percentage where a higher percentage means greater equality, the way to study the equality proportion is by means of the difference of unity minus the quotient of empirical dispersion over maximum dispersion, whether the individual empirical dispersion—absolute value of the Bias Level—or the sample dispersion—

Mean or Standard Deviation (DMoS)—to be divided by the maximum dispersion, theoretical or empirical: at the individual level, Maximum Possible Theoretical Bias or Maximum Possible Empirical Bias; at the sample level, Maximum Possible Theoretical Deviation, Mean or Standard.

11.7.8. In bias study at the sample level, Mean or Standard Deviation over Maximum Possible Theoretical Deviation, Mean or Standard, or Intermediate Deviation over Maximum Intermediate Deviation.

11.7.9. A given event may be accepted in Validity or Significance, individually, and rejected at Sample Level or Significance of Mean or Standard Deviation (DMoS). If critiquing directly the normal Bias Level, only that inference will be free of any factual error which is sufficiently rational both individually and at the sample level at the same time.

11.7.10. Likewise, for an event to be accepted proportionally, it must be accepted both in Individual and Sample Critical Proportion; however, an event may be accepted in an Empirical Individual Critical Proportion and not in the theoretical one, or vice versa—accepted in the Theoretical Individual Critical Proportion and not the empirical—and, being accepted in one of the two and not in both at the same time, it may be rejected in the Sample Critical Proportion, or, if accepted, be accepted only in the Theoretical Sample Critical Proportion and not in the empirical, or vice versa. Ideally, however, for an event to be truly a universal event, it could be accepted universally, including in the Empirical Probabilities of Equality or Bias, Positive or Negative.

11.8. From the Critical Requirement of Normality to the Critical Proportion of Normality

11.8.1. Concept of sample normality

11.8.1.1. Rational critique can be a rational critique of the sufficiency of the empirical tendency shown in the sample, whether individual or sample empirical tendency; the most immediate individual empirical tendency is the empirical probability itself; the individual empirical tendency of dispersion is the normal bias of the subject or option; the sample empirical tendency is the sample empirical dispersion.

11.8.1.2. Now then, to rationally guarantee that the empirical tendencies of the sample are truly representative of the universe under study, it is necessary a priori that the scientific policy decide which sample is more representative, so that the statistical decision is as theoretically reliable as possible on a sufficiently reliable sample.

11.8.1.3. To critically study when a sample is sufficiently reliable one can use either Sample Sufficiency, difference of a critical probability minus the inversion of the sample, the critical probability being equal to the reliability percentage X over one hundred, 1st TABLE, except when the ideal is a sample of zeros; or one can use—except for this same case—the Critical Requirement of Normality, and the Requirement of Normality, depending on the object of study.

11.8.1.4. More specifically, for the sake of critical reason, what is of greatest interest is the Sample Sufficiency and the Critical Requirement of Normality, insofar as a critical reason is involved.

11.4.1.5. One of the characteristics of Impossible Probability is equifinality: for the same contrast, different models can be used. To study the individual tendency toward equality of opportunities, one can use: Validity of Equality, Significance of Equality, Individual Critical Proportion of Equality, Theoretical or Empirical, Probability of Equality; to study the individual tendency toward positive bias: Validity of Positive Bias, Significance of Positive Bias, Individual Critical Proportion of Positive Bias, Theoretical or Empirical, Probability of Positive Bias; to study the individual tendency toward negative bias: Validity of Negative Bias, Significance of Negative Bias, Individual Critical Proportion of Negative Bias, Theoretical or Empirical, Probability of Negative Bias. In Impossible Probability, the contrast of ideas can take different forms; none of them is better or worse—they are simply different. Scientific policy must decide which to use in the contrast of ideas depending on the approach, object, objectives, and ideals.

11.8.1.5.1. Likewise, the rational critique of whether a sample is sufficiently normal to guarantee reliable results can take different forms; besides Sample Sufficiency, Requirement of Normality, and Critical Requirement of Normality, another different form would be the Critical Proportion of Normality.

11.8.1.6. The scientific policy that morally demands acceptance of the truth can only demand the truth on a normal sample. A normal sample is that sample which reliably represents the most normal tendencies of a universe, and upon the most normal tendencies of the universe one rationally critiques the individual or sample tendencies, in order to make the decisions upon which to establish inferences.

11.8.1.7. The fact that a sample is as normal as possible—that is, representative of the whole, but not the whole itself—necessarily implies that many cases of the universe will be excluded from the sample, insofar as the sample is not the totality of the possible universe in the possible space–time history of the universe. The sample is only a portion of the history of the universe; the sample is above all a historical sample of a part of the history. The sample only shows what happens in a given space at a given time; but the sample, insofar as it is limited, does not include everything that happens in absolutely all space–time—only a part of what happens in a part of history—this being precisely the error that scientific policy must be willing to accept: that a normal sample is normally representative of the whole, but the sample is not the whole itself, only a portion of reality we are willing to know, a margin of error we are willing to accept.

11.8.1.8. Sample Sufficiency, Requirement of Normality, Critical Requirement of Normality, and the Critical Proportion of Normality shall have as their objective, for scientific policy, to guarantee the greatest normality, in order to validate the ideals, the empirical hypotheses, upon the greatest possible representativeness that reliably shows what should be the true behavior of the universe; so that, upon the tendency of the sample, one may describe or infer reality itself, within a margin of uncertainty.

11.8.1.9. Sample Sufficiency, Requirement of Normality, the Critical Requirement of Normality, and the Critical Proportion of Normality shall have practical applications for the study of the representativeness of the sample, both in the study of equality of opportunities and the study of positive bias, and in those models of decline study over two measurements, where at least in the first measurement it is required that the sample be as representative as possible, in order to study in the second measurement the derivation toward a sample of zeros, starting from a first measurement that is sufficiently representative.

11.8.2. The Critical Requirement of Normality will be applied to studies of bias and equality whenever the magnitude of the raw scores must be greater by a critical value than the magnitude N; otherwise the Requirement of Normality would be applied, and it will be resolved as follows: inversion of N minus inversion of the raw scores or frequencies, and the result minus a critical probability; zero or positive, the sample is accepted. The critical probability is equal to the reliability percentage X, over one hundred, times the inversion of N.

Critical Requirement of Normality =

(1/N – 1/∑xi) – p(xc) = zero or positive the sample is accepted

$p(xc) = 1/N \cdot (X : 100)$

X = reliability percentage

11.8.3. Critical Proportion of Normality [critical flexibility], like the previous one, only for studies of bias or equality in which the magnitude of the raw scores must be greater by a critical value than the magnitude N, being equal to unity minus the quotient of inversion of the raw scores or frequencies over inversion of N, and the result of the differential minus critical probability; zero or positive the sample is accepted. Critical probability equal to the reliability percentage X over one hundred, 1st TABLE.

Critical Proportion of Normality =

[1 – (1/∑xi : 1/N)] – p(xc) = zero or positive the sample is accepted

p(xc) = X : 100

X = reliability percentage

11.9. Synthesis of critical probability

11.9.1. The ideal model of critical reason upon which critical activity must be carried out is critical reason; critical reason is critical probability. Nevertheless, it is important to recognize other possible empirical criteria—for example, First, Second, or Third, Empirical Mode, of Error or Reliability—in order to determine when something may be empirically possible, and when it is really critically possible, as will be explained starting from Possible Variation.

11.9.2. There are two models of rationally critical study according to the two fundamental types of rational critique: error studies or reliability studies. In critical probability the margin of error or reliability is determined on a percentage X of error or reliability; the percentage X of error or reliability over one hundred is the critical probability of the 1st TABLE, which will be in force for the Critical Bias Level and for the critical proportions, except for the Empirical Individual Critical Proportion of Negative Bias. In the other models of rational critique, the percentage X of error or reliability, over one hundred, must be multiplied by that possible maximum or ideal value that can be obtained in the contrast of ideas. In the contrast only the minimum possible error is accepted, on the maximum possible value calculate the critical probability, as a margin of error, product of the maximum value by the quotient of the percentage X of error over one hundred. In the case that from an ideal one wishes to achieve the greatest ideal margin possible, its product by reliability percentage X over one hundred equals critical probability as a margin of reliability.

11.9.3. If a critical probability is calculated on a percentage X of error, the critical probability is the margin of error, and it will be said to be an error study. In error studies—those in which the critical probability is calculated on the percentage X of error—the empirical model must be equal to or less than the margin of error calculated on the percentage X of error.

11.9.4. If a critical probability is calculated on a percentage X of reliability, the critical probability is the margin of reliability, and it will be said to be a reliability study. In reliability studies—those in which the critical probability is calculated on the

percentage X of reliability—the empirical model must be equal to or greater than the margin of reliability calculated on the percentage X of reliability.

11.9.5. Always, and absolutely always, every statistical decision issued by scientific policy, to accept or reject an empirical hypothesis—here according to a critical probability—is a statistical decision within the percentage of error we are willing to accept. To accept coherence within a margin of error means to accept coherence within a margin of possible incoherence; all coherence within a margin of incoherence is a coherence that may possibly be incoherent, although provisionally it is accepted as coherent, until at the moment of truth it is in fact incoherent and must be replaced by a *superior* and deeper coherence. For this reason, while a provisional truth is accepted, provisionally, every truth will be a truth within the margin of error we are willing to accept, insofar as every truth will be a truth within the margin of appearance we are willing to accept about the truth. Everything reliable will be reliable within a margin of error in which what is reliable may cease to be reliable.

11.9.6. The percentage of error we are willing to accept in the statistical decision, to accept or reject an empirical hypothesis, in error studies is equal to the percentage X of error, from which the critical probability was calculated in error studies.

11.9.7. The percentage of error we are willing to accept in the statistical decision, to accept or reject an empirical hypothesis, in reliability studies is equal to the difference of one hundred minus the reliability percentage X, the percentage of error being that within which scientific policy issues the statistical decision.

11.9.8. Every statistical decision, to accept or reject an empirical hypothesis, issued by scientific policy is a statistical decision within a percentage of error, whether in error or reliability study; and every statistical decision of scientific policy, as a function of the percentage of error, will have associated a percentage of reliability. Even if a statistical decision were to admit only zero percent error or one hundred percent reliability, in critical probability, in any case, there is a margin of error inherent to every statistical decision—whether or not it admits a percentage of error in critical probability—which is the inversion of the sample, the probability of error of sample representativeness. As

the inversion of the sample tends to zero, Theoretical Reliability increases, the sample being more reliably representative of the universe.

11.9.9. In reliability studies, on critical probability, the reliability percentage, in the statistical decision to accept or reject an empirical hypothesis issued by scientific policy, is equal to the reliability percentage X upon which the critical probability is calculated.

11.9.10. In error studies, the reliability percentage, in the statistical decision issued by scientific policy to accept or reject an empirical hypothesis, is equal to the difference of one hundred minus the percentage X of error.

11.9.11. The decision to accept a percentage X of error or reliability will depend on the moral demand of scientific policy to accept the truth; in error studies, ideally one reduces error as much as possible to increase reliability as much as possible; and in reliability studies, one increases reliability as much as possible to reduce error as much as possible—logically.

11.9.12. Within Impossible Probability there are different types of statistical decision upon which reliability depends. The first decision of scientific policy in relation to the object of study is the very decision of what the object of study is, which implies defining N—whether N is a universe of infinite subjects or options to study raw scores in magnitude of intensity, or whether N is the limited N options to study frequencies in magnitude of occurrence—and upon the object of study, to define the ideals of scientific policy; and upon N and the ideals, the first statistical decision relative to error is the decision to accept the sample N or the sample of raw scores or frequencies, whether by Sample Sufficiency, Requirement of Normality, Critical Requirement of Normality, or Critical Proportion of Normality. The next decision will be in relation to the contrast model, to decide the model of rational critique, individual and sample, and upon the contrast model the margin of error we are willing to accept in the model, the critical probability in the contrast of ideas.

11.9.13. The percentage X of error, or percentage X of reliability, is in essence a morally political variable, because depending on error or reliability, one will tend toward a morally, politically different truth. The fact that ***the moral variable X is variable implies that ideologically different models can accept different moral models, depending on their moral–political demand before the truly objective truth in itself, objectively moral, of the universe—that true truth in itself of what really happens.***

11.9.14. The percentage X, of error or reliability, is a percentage X decided and accepted by scientific policy; every scientific policy, insofar as it is ideological policy, will essentially be a policy of the moral ideology of science; modern science lacks absolute universal maxims.

11.9.15. In reality, scientific policy accepts a first margin of error when accepting the sample; to know—even partially—reality itself, it is necessary to accept reality itself partially; to accept reality itself partially implies a factual error.

11.9.16. Every empirically accepted hypothesis will be provisional in direct proportion to the factual or critical errors that one is willing to accept.

11.9.17. Only if in critical probability one accepts zero percent error, or one hundred percent reliability, will the provisionality be directly proportional to the factual error.

11.9.18. Every truth about a given sample will be a historically provisional truth, insofar as its historical validity will be limited by the rational or necessary, sufficient or infinite time in which the possible margin of error will be inevitable.

11.9.19. Beyond contemporary ideologies there is only a relatively reliable appearance: science. In a possible infinite human history, an *infinite science would be possible* [This is GAI]. The possible hypotheses that can succeed one another in a possible infinite history are infinite; any possible knowledge will be insignificant in relation to the infinite. Dialectically, the insignificant can determine everything; dialectically, nothing and everything are identical because they are opposites, within the margin of incoherence, error, contradictions—logical or moral—***we are willing to accept in order to preserve life***.

11.9.20. Indicate once again, so that there is no difficulty whatsoever in interpreting the equations presented, that in order not to saturate the equations with brackets and parentheses—making them more complex—whenever the concept of inversion of N is used in any equation, it is written directly as inversion of N, 1/N, without brackets or parentheses,insofar as it is a numerical value in itself, an operational unit. Thus, every time the inversion of N, 1/N, appears without brackets or parentheses, squared, it must be interpreted as the square of inversion of N, that is, the square of the numerical value resulting from dividing unity by N. And every time inversion of N, 1/N, appears in some differential or quotient, it must be interpreted as the inversion of N itself applied to what is being operated upon, insofar as a numerical value in itself equal to inversion of N, unity over N, as an operational unit in itself. The reason why inversion of N is not put in brackets or parentheses is simply so as not to saturate the equations with brackets or parentheses and to make them more easily interpretable [in this English version I am using brackets when I mention 1/N in all equations].